DESIGN AND IMPROVEMENT

of

SCHOOL GROUNDS

BY

W. C. COKER AND ELEANOR HOFFMANN

BUREAU OF EXTENSION BULLETIN

Published by

THE UNIVERSITY OF NORTH CAROLINA

PLATE 1

PALMETTOS ON SMITH ISLAND, N. C.

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SPECIAL SERIES No. 1

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UNIVERSITY OF NORTH CAROLINA
CHAPEL HILL, N. C.
1921

INTRODUCTION

In order to promote the beautifying of school grounds in North Carolina, the Bureau of Extension has established a new division called the Division of Design and Improvement of School Grounds under the immediate direction of Dr. W. C. Coker, Kenan Professor of Botany and Director of the University Arboretum, and Miss Eleanor Hoffmann, secretary of the division and field worker.

Bulletin Contains Designs and Suggestions

To facilitate its work and to present the program of ground improvements which it contemplates, the division has prepared the following bulletin which contains a number of designs for actual and hypothetical school grounds, each design being accompanied by a planting plan showing the plants to be used. There are also photographs and sketches of illustrative plantings from various sources such as the University Arboretum and private grounds. All designs and planting plans are by Dr. Coker. Photographs are by Dr. Coker, R. W. Foister, Dr. J. K. Small and various students. All inking in of plates (except pls. 5 and 6) and text figures 1 and 2 have been done by Miss Hoffmann. Miss Cornelia S. Love has done the cover drawing, plates 5 and 6, and the other text figures.

The text of the Bulletin consists of advice as to principles of planting so as to secure the most desirable effects, together with descriptions of trees, shrubs, and flowers recommended for use in the three main sections of the state—east, middle and west.

Service Throughout the State

A second purpose of the Division is the giving of direct assistance through the preparation of specific plans by Dr. Coker and through personal visits by Miss Hoffmann to any school that indicates a desire for help. Miss Hoffmann will also visit other organizations as opportunity allows, in order to arouse interest in the general subject of the improvement of grounds.

Method of Procedure

In offering this service, the Bureau will follow the usual practice which obtains in all its service—no charge will be made for personal visits except that the traveling expenses of the field workers will be borne by the school or organization visited.

Requests for additional copies of this Bulletin or for other information should be addressed to the Division of Design and Improvement of School Grounds, The Bureau of Extension, Chapel Hill, N. C.

Other State Aid

In designing the school building and in the choice of a site the State Department of Education at Raleigh through the Director of Schoolhouse Planning, Mr. John J. Blair, is now giving valuable aid. Improperly placed buildings or inadequate grounds make it impossible from the start to develop and improve the grounds to meet the needs of the community.

LOUIS R. WILSON, *Director.*

PLATE 2

SCENES IN THE UNIVERSITY ARBORETUM
CHAPEL HILL, N. C.

WHY MAKE THE SCHOOL GROUNDS ATTRACTIVE?

Without encroaching too much on the philosophy of Herr Teufelsdröckh we may divide clothing into two classes—clothes of the body and clothes of the spirit.

In the Garden of Eden they placed most emphasis on clothes of the spirit. And why? Because in the Garden of Eden for a while at least the spirit was dominant over the body. If we find today that the clothes of the body are of more concern to us than the clothes of the spirit it means that the body is dominant over the spirit.

We cannot choose or modify to our wills all of the garments that our souls must wear, but it is one of the most wonderful blessings that we have to be thankful for that almost all of the vesture that is beyond our control is beautiful and pure.

The Earth Spirit in Faust speaks of nature as the "Living, visible garment of God." It is also our garment, and as we look around us at this wonderful world, at the pageantry of nature in all its glory, shall we not walk proudly that we have been thought worthy to wear such vestments?

Yet in the midst of all this it is a sad fact that most of us bring our daily offerings to the God of Ugliness and Dirt. Almost all the dirty and ugly things that we wear are of our own making.

> Old papers and pans, old bottles and cans,
> Dead chickens and cats, the flies and the rats—
> And other pollutions unfitting to tell—
> That send up for incense only a smell.

Do we realize that all of these things are feathers in our plumage? That each of these things is a piece of the stuff from which we have woven our spiritual garments? Are we not ashamed to wear such clothes? Yes, doubly ashamed since we both make them and wear them!

The things that are around us act upon us and elevate or depress us according to their nature. As Byron says "I live not in myself, but I become a portion of that around me." When a soldier puts on his uniform he becomes more of a soldier than before. He will hold himself more proudly, and be braver, too.

In one of his essays Chesterton remarks that we should all wear clothes according to our profession and beliefs. What a relief it would be in dealing with a man to see that he had on the uniform of an honest man. Could he stoop to a lie? Could he dishonor the uniform he wore—an azure uniform with stars in it?

It is not possible to overestimate the ennobling influence of things that are beautiful and pure. They can strengthen and sustain beyond all power save human love. Encompassed and uplifted by the glory of the world Whitman exclaimed: "I am larger, better than I thought; I did not know I contained so much goodness." This expansion of spirit before the pageantry of nature was proof of his own greatness, for "The perception of beauty is a moral test."

You remember Hawthorne's story of the Great Stone Face: When only a boy Ernest saw it there on the mountain, the wonderful lineaments of a divine face, carved from the living rock by the hand of God. It was with him day by day. His mind took it in; his soul absorbed it; his tentacles of love and faith went forth and touched it. He rose to meet it—until at last he stood transfigured, grown into the likeness of that majestic face.

Tagore has said: "Every child that comes into the world is a message that God is not yet discouraged of man." What if we should take this message seriously, take each child as one more solemn effort of nature to try the possibilities of the human soul? Would we be willing to let this messenger report another failure, this great effort be again futile? Only the profoundest genius can rise far above his surroundings, and few indeed are they who rise above them at all. What if some day a child should come into the world and find it prepared to receive him!

We have a peculiar duty, fellow teachers, not only to ourselves, but to the young people in our care. Surround them with beauty and they will stoop less easily to an ugly act. Make things clean about them and they will give heed less quickly to an unclean thought. Set before them that which is worthy, and day by day they will elevate their spirits to meet it face to face.

How to Begin

Most school boards have very little money at their disposal either for buying more land or for beautifying what land they have, but this lack is being met in various ingenious ways on the part of individuals,

towns and organizations. Unfortunately school superintendents are swamped with work, and not many perhaps are really much interested in the appearance of the grounds. Many, however, who appear indifferent may easily be aroused if their attention is attracted in the right way. Individuals in every community, eager to pass on this love of plants to their children and neighbors, would be glad to give trees and shrubs to the school. To secure contributions and plants it is a good plan to publish a list of the kinds needed in the local paper.

Perhaps the most efficient method of arousing interest and enthusiasm is through local clubs like Women's Civic Leagues and Parent-Teachers' Associations. Splendid work has been done in one town where, through the zeal of the Women's Civic League, a property owner promised to give a valuable tract of land adjacent to the school grounds if they would raise $500 for playground apparatus. By fairs, dinners, sales and individual contributions the $500 was finally raised and now the school owns enough land for playgrounds, basketball, baseball, three tennis courts, and a charming grove for a public park.

In another town the stimulus for improvement came through the president of the Parent-Teachers' Association who had just returned from the west where she had been tremendously impressed by the beauty of the school grounds. In another town the Parent-Teachers' Association of one of the grammar schools had had the offer from a public spirited member of all the shrubs they could use for the front of their grounds and had written to the University for planting plans. If the enthusiasm lasts this school will soon be a pleasure to the community and its children, setting a standard that many will try to emulate. Pioneers in such progress have an influence much greater than they often realize.

Where the school is fortunate enough to have a good course in botany or nature study, and in every school where the younger children are being taught something about plant life, nothing could be of more interest to class work than occasional trips to the woods and fields for shrubs and trees to plant in the school yards. Every child notices the plants that have showy flowers in the spring or brilliant foliage in the fall. A field trip with the children at any time of year will result in the finding of many things to transplant, all without the slightest expense, and will result in greater knowledge and love of nature.

Foundation Planting

Soften the outline of the buildings and relate them to the lawn by placing shrubs in angles and here and there along the sides. If only one sort is used in a place it should be a kind that branches outward from the base as it bends over and touches the ground. Among the best of these are *Van Houtte's* and *Thunberg's spireas, winter jessamine, forsythias, Thunberg's barberry, oak-leafed hydrangea,* the *deutsias,* and such evergreens as *arbor-vitae, yew, box, holly-leaved olive, sweet olive, pittosporum,* and *yopon.* Taller sorts that tend to become bare below should be planted behind others that are lower and reach the grass. Many native wild shrubs that flourish in the vicinity can be used with fine effect if sensibly chosen and placed. (See p. 10, also the shrub lists.)

Walks and Drives

Run the walks and drives where most needed, but try to keep them near the buildings and around the borders. Do not put them directly against a building or fence, but leave a space about three feet to seven feet wide for a grass and shrub border. Grounds that are cut up by a multitude of small trails have lost a large part of their beauty. If the walks decided on as the fewest number possible are made quite adequate in breadth, clearly laid off and surfaced with gravel, and bordered by a row of stones or bricks, it will be much easier to keep people off the grass than where carelessly laid and poorly defined walks tempt one to ignore them. Where curves or angles offer a strong temptation to cut across the grass to save a little distance, about the only practical deterrent is to place a group of shrubs along the critical points, and the more formidable these are the better. If *trifoliate orange, Japan quince,* or strong-growing *roses,* such as *McCartney, prairie* or *rugosa,* are used they will stop even the most venturesome with their thorns. Do not try to avoid straight walks where they are more convenient, especially when there are other straight lines near, such as by boundaries of the property or near the buildings. A straight line is no more unnatural than a curved one, though it is rarer. All depends on circumstances. A curved walk or drive through open country

PLATE 3

RHODODENDRON CATAWBIENSE (Wild). CHAPEL HILL, N. C.
Reprinted from the Journal of the E. Mitchell Sci. Soc. Vol. 35, Plate 19, 1919.

or lawns or through woods is much more pleasing and natural-looking than a straight one, and on uneven ground a straight walk would offend all ideas of fitness and harmony. On the other hand, nothing is more pleasing than a long, straight walk bordered with shrubbery or arched with trees, leading with obvious purpose to some distant objective or vista. The formal garden near the house with its straight lines and symmetrical arches and curves is a recognized unit of artistic design, and when properly connected with other features in no way interferes with the natural treatment of other sections of the grounds.

Open Spaces

Keep the lawn area open in large part and group the trees in the background around the margins, with shrubs and flowers in front of them in such amount as conditions allow. The choice and arrangement of these plants will show results in proportion to the skill and experience of the designer. If the available grounds must be divided into more than one section, as is usually the case, they should be connected if possible by as broad a lawn strip as space allows, and this should be left open so as to allow an unobstructed view of the entire distance. This will afford pleasing vistas and a sense of spaciousness not possible in a number of separated, smaller areas.

Making the Lawn

A really good lawn is expensive to make and to keep, but a respectable grassy area can be had for very little cost. For the least possible outlay proceed as follows: see that the soil is well drained and all rocks, stumps and trash removed; plough deeply and if the surface is irregular with ridges and sinks use a drag to produce a level surface or an even slope. Make the ground as rich as you can afford with stable manure, cottonseed meal, or commercial fertilizer. Harrow with a disc harrow until the ground is well pulverized then follow with finer harrows to smooth. Sow the grass and cover with a cedar top or a very fine harrow. In the coastal plain the most practical grass is *Bermuda,* which may be planted by scattering and covering up the chopped-up runners. In the middle and western sections use a mixture of equal parts *Kentucky blue grass, creeping bent grass, sheep fescue,* and *perennial rye grass* and plant at the rate of a ~~thousand~~ hundred pounds per acre in fall or early spring. It is absolutely necessary to use a lawn mower often if the lawn is to be at all presentable, and watering in dry seasons

will be a great help. For more detail as to lawn making and the eradicating of weeds see an article by Coker in the *Journal Elisha Mitchell Scientific Society,* Vol. 31, p. 162, 1915.

Boundary Planting

It is usually best to outline the entire property by a distinct boundary mark of some kind, preferably a stone wall or a hedge, and not to have this easily penetrated except at certain entrances. This will greatly lessen the danger of destructive invasion by thoughtless people or wilful marauders.

Distant Views

If distant objects of beauty can be seen from the grounds, as mountains, valleys, rivers or ocean, the planting should be so ordered as to leave these unobstructed and to accentuate them as much as possible by a framework of trees. If it is possible to have the trees arch over these distant views it will add a wonderful charm to the picture. It is equally obvious that all ugly sights, such as outbuildings, back yards of neighbors (unless they are kept better than most), dump heaps, etc., should be hidden by appropriate plantings.

What to Plant

It is best to use our own native trees, shrubs and flowers, to as great an extent as is consistent with expediency and common sense. As in designing, so in planting material, there have been and still are contending "schools." The naturalistic school has now largely replaced the older formalism in design and this has carried with it a similar "natural" tendency in the selection of the plants to be used. It is well to avoid the extremes of any tendency and to savor dogmas with common sense. There are those who carry the naturalistic in planting so far as to insist on the use of only such plants as grow wild in the immediate vicinity. A garden so planted might be a good hobby for a few people so inclined, and could be made very beautiful. It could not be made, however, without far more labor, thought and knowledge than is usually available or would be necessary under a less rigid conception. It should not be forgotten that the exotic plants that are most used in our gardens have won their way there by very superior qualities that have stood the most exacting test of years. In hardihood, adaptability

and staying power they have proved themselves superior to many of our native plants that might be more beautiful or picturesque if all their exacting requirements were met.

In the case of trees, there is far less reason for the use of exotics than with shrubs and flowers. Our state is so rich in trees of every form and size that there is little need of our going outside of our natural wealth. We cannot find anything for this climate that can equal a large number of our own species for permanence, size and beauty, and it should be the rule to use our natives in the great mass of our plantings. Even here, however, it would be foolish to exclude such exotics as *crape myrtle* and *mimosa* that fill so admirably the special needs that nothing we have can quite supply.

A few more words are necessary here to avoid a wrong impression. While there are many of our native flowers that have already become recognized as most desirable ornamentals, there are also many others that have not yet been given a fair chance to show what they can do with a little encouragement from man. We have in the past shamefully neglected our opportunity to test, select, breed and improve them. Most of the best things we have from abroad are horticultural forms that have been selected from many variations and are the result of long years of conscious effort to improve. Many a gem in the woods at our very door is only awaiting a little digging and polishing to be worthy to take its place among the ornaments of any garden.

Regional Differences

From the evidences of its plant life the climate of North Carolina, from Smith Island to the mountain summits, exhibits about the same differences as that shown between northern Florida and Labrador. Over such a wide range of conditions it is impossible for us to give detailed advice in garden and horticultural practice, and a distinct modicum of common sense must be infused into the reading of this sketchy Bulletin if the best results are to be expected. As the old darky said who had sold a mule and was asked how he should be handled: "Dat depens on which en ob de mule you talkin' bout." We have tried throughout to indicate the regions most suited to the plants mentioned, but much that is said must be taken as not applicable to extreme cases. On account of the unique interest of the *sub-tropical strip,* which includes most of Brunswick, New Hanover and Onslow counties, we have given one hypothetical plan for a school in this region. Of the plants used in

this plan all are native there except the *Cherokee rose, oleander, tamarisk* and *tea.* There might also be used in the plan such half tender things as *loquat* and *camellia.* In other parts of the state few know that the *tea plant* is almost or quite hardy along our coast and as far west as Fayetteville. Few also know the beauty and wonderful decorative value of our native coastal plants. Even in their own home they are often neglected for exotics of far less charm and character.

The higher mountain tops, while of intense interest botanically, do not support school houses and need not detain us here. But our large *mountain region* of moderate altitude (1800-4000 feet) is so wonderfully adapted to beautiful evergreens, as *spruces, firs, hemlocks,* and those magnificent members of the heath family as *rhododendrons, kalmias, azaleas,* etc., that no one there need go away from home to find things fit for the most ambitious estate. In fact, there is no similar group of shrubs in the world that can surpass our North Carolina natives of the heath family. There are so many other beautiful shrubs in the mountains to supplement these with that one is tempted to go on and on in their praise. There are between 150 and 160 species of shrubs in our mountains, many of which could be easily cultivated in their own region. A few of the most conspicuous are (besides the above) *sweet fern, yellow root, sweet shrub, syringas, hydrangeas, spireas, red haws, locusts, sumachs, huckleberries* and *viburnums.* (See p. 27 for condensed lists of plants best suited to each section.)

Select the Strong and Hardy

Use only plants that are vigorous and quite hardy in your neighborhood, that is, unless you have both time and inclination to meet the exacting needs of more tender and helpless things. We could easily have added hundreds of species to those actually used in our plans in this pamphlet or recommended as desirable, but we have rigidly excluded all that cannot succeed with the minimum of attention. Others we have excluded for no reason except lack of space. It may be said there is not a native tree or shrub in the state that could not be used to advantage under suitable conditions.

Mass Planting

As a rule it is best to use several plants of the same kind together, or in ample grounds even a large number, so that more effect and more repose can be secured. The extent of each shrub mass should be de-

PLATE 4

LAUREL OAK (Darlington Oak) IN MR. J. J. LAWTON'S LAWN, HARTSVILLE, S. C.

The tree partly shown at left is a Deodara Cedar.

Reprinted from the Journal of the E. Mitchell Sci. Soc., Vol. 32, Plate 2, 1916.

termined by some natural limit, such as angles, bays, tops of knolls or areas between larger plantings. In the absence of such natural limits separate masses should not terminate abruptly, but should intermix gradually at the points of contact. In long curves trees should be brought forward to break the shrub borders here and there and give a natural appearance to the mass divisions. A modified form of mass planting, and one having many attractions, is the mixing of two or three sorts of shrubs (or herbs) in numbers and in a varied proportion to assume a natural aspect. The most common and usually the most satisfactory combination of masses is that of two species of unequal height, the taller behind the other, and of a sort in which the flowers harmonize in color and bloom at the same time, such as *Japan quince* and *Thunberg's spirea.* Mass planting should not be made a dogma, however. There is an interest of its own in a walk bordered by many kinds of shrubs in intricate mixture, especially if these shrubs are close to the walk and are clipped like a hedge on the walk side.

In places of moderate size it is hardly possible to use trees of one kind in large masses, but in most school grounds *pines, cedars* and other evergreens can often be grouped in numbers in the angles or along the boundaries.

How to Plant

The following practice should be followed in setting the plants. Never let the roots dry out. If from a nursery open the box as soon as it arrives and sprinkle the entire contents well. Take the plants out one or a few at a time and set them about 2 in. deeper than they stood before, putting the best soil around the roots and packing very firmly before the hole is quite full. Add other loose earth nearly to fill the hole and do not pack. Finally, put another shovelful or two of good manure on top and let stand. If the soil is not very rich, good, well rotted manure should be mixed with all the soil put into the hole. If the ground is rich the holes need not be larger than is necessary to allow the roots to spread out well; if poor the holes should be larger and plenty of manure or rich earth used in planting. The roots of course should be well spread out in the hole, and if they are complicated the earth should be carefully pressed between them with the fingers as it is thrown in, so as to have it firmly compacted about all the roots. All broken and wounded roots should be cut off above the injured place by a pair of sharp pruning shears. In planting trees drive a six or seven

foot pole near the plant before the roots are covered, and after planting tie the stem with strips of cloth or wire run through old garden hose.

Rhododendrons and Azaleas

Rhododendrons, azaleas, kalmias and other members of the heath family require a special word as to treatment. They will grow well if adapted and will fully repay all necessary trouble, but there are certain conditions that they demand. They do particularly well in the mountains, principally because of the greater prevalence of moist and well drained soil, but *R. catawbiense* and its hybrids can be made to succeed well all the way to the coast. (See pl. 3.) It is not generally known that *R. catawbiense,* which is usually supposed to be confined to the high mountains, is found wild in robust condition at Chapel Hill and even as far east as Selma on the coastal plain (See *Journal E. Mitchell Sci. Soc.,* Vol. 35, p. 76, 1919). The plants require a moist, but well drained soil containing humus, absence of lime, some shade (particularly in the afternoon) and a mulch of rotting leaves or straw, the thicker the better. If the conditions are not already suitable, which they rarely are outside of the mountains, the soil should be dug out for a depth of 2½ feet over the whole bed to be used, and the hole refilled by putting stones or bricks or coarse gravel in the bottom a half foot deep, and filling up with good loose soil mixed with plenty of leaf mold and some well rotted manure. After planting and watering, the mulch of rotting leaves should be put on at once.

Long Leaf Pine

The *long leaf pine,* and to a less extent other pines, are difficult to transplant and also require a word. The difficulty is due to the long, large tap root and absence of superficial rootlets. One should look for young pines one or two feet high that are growing near the margins of bays. Where the ground is wet a little below the surface it will be found that superficial spreading roots have been formed instead of a tap root. If a spade is plunged in all the way around the tree about a foot and a half away from it, and no lifting done until the circular cut is finished, it will often be possible to lift the tree out with a large slab of earth holding to the roots, and by careful handling this may be got into the prepared hole without falling away. Broom sedge or other grass, if growing around the pines, will help to hold the soil to the roots.

Cutting Back

Except in case of evergreens received from nurseries with a ball of earth wrapped around the roots, or of herbs that can be lifted in the shovel without disturbing the roots, all plants should be strongly cut back when planted. For those who are without detailed knowledge of practice it is best to make a general rule to cut back all trees to a single stem and to cut off this stem one or two feet from the top. In this case, as in all subsequent trimming, all branches should be cut even with the stem without any stub. (See figs. 1 and 2.) Shrubs should have all the stems shortened back about half way and dead or imperfect parts removed. Broad-leaved evergreens such as *magnolias, photinias, camellias,* and *hollies,* if received with a ball of earth should have all or nearly all the leaves removed and the branches shortened back about half. If received without a ball of earth, or if taken from the woods, they should be trimmed to a simple stem and the top cut off, as in the case of deciduous trees, all leaves being removed from the stem.

After Care

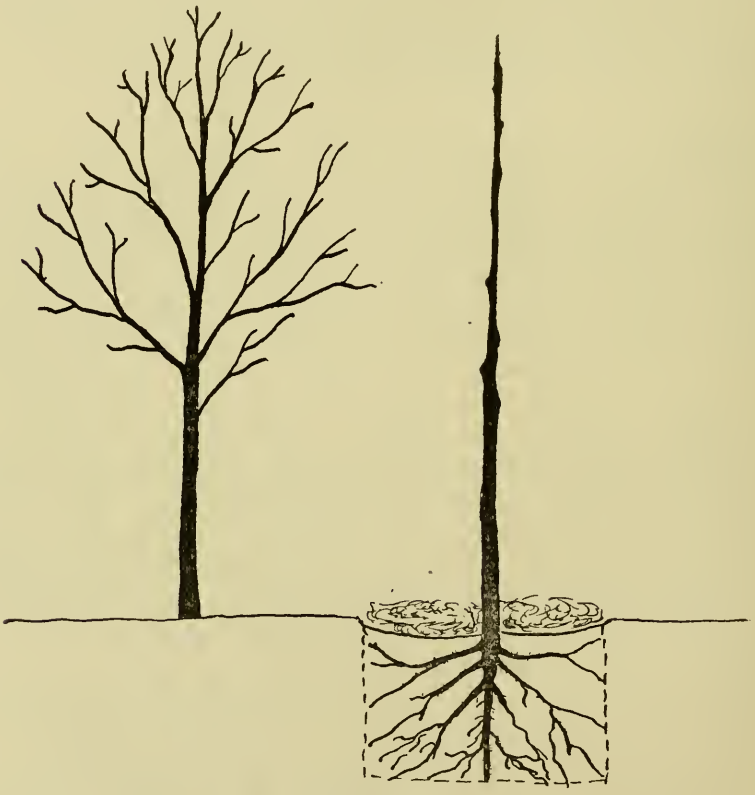
The proper care of the plants after setting out is at least as important as a right start, and it is to the absence of such care that most failures are due. Struggling against grass and weeds for water, fertilizer and sun it is no wonder that many shrubs are smaller after a year or two than they were at the start. Starved and neglected, they have about as much chance to perfect themselves as does a child in a slum tenement. Before entering on any plans for improving the grounds, the expense and labor involved in the subsequent care should be thoroughly realized and arranged for. Where children are about and not well controlled it is absolutely necessary to protect all planting from their ruinous play and trampling at dangerous points. Beds should be distinctly outlined with rocks, bricks or planks, and it is best to use thorny plants in critical places. It is well to remember, though, that plants should not be put in places where they would unduly crowd or inconvenience the children. Think first where the plants have a right to go and then thoroughly protect them.

During the first summer all plants should be watched carefully and watered when necessary. Some will require little or no water; others will need several thorough waterings during severe droughts. It is especially necessary to water all evergreens and such trees as oaks, hickories and pecans during the first summer. After that it is only in

severe droughts that water will be needed to preserve life, but watering will always repay the trouble in the increased growth and beauty. All weeds and grass should be kept away from the plants for several years, or until they are thoroughly established and can keep down these enemies with their shade. Around individual trees a circle three or more feet across should be kept worked and fertilized for several years. It will be of great benefit in retaining moisture and discouraging weeds if the cut grass is raked up and put around the trees and shrubs as a mulch.

Pruning

The barbarous practice of topping large trees, so prevalent in our section, should never be thought of. The result is to destroy the beauty



FIGURES 1 AND 2

of the tree and to shorten its life by many years. If trees are too close together and begin to crowd each other, or make too dense a shade, some should be cut out, not all topped. By a proper choice of plants

Figure 3

the subsequent care can be reduced to a minimum, but there will always be a certain amount of pruning necessary. A strong knife, pruning shears and a saw are the only implements necessary to keep trees, shrubs and hedges in order. Trees should have their broken and useless branches removed close to the trunks so that no stub is left. If two

or more uprights try to form all but one should be removed; useless branches that crowd others should be cut off, as well as suckers from the branches or roots. Shrubs that tend to become too thin or straggly or too large for their place should be sheared back all around, or where needed. Tall open growers like *roses, weigelas, altheas, hydrangeas,* and *yopon* are particularly in need of an annual shortening back. All dead or unhealthy shoots should be cut out. Those shrubs that bloom on the old wood in early spring, such as *spireas, forsythias, weigelas, quinces,* etc., should be pruned immediately after flowering, others that bloom on the new wood such as *hydrangeas, roses, altheas, sumachs, smoke bush, chaste tree,* etc., may be pruned at any time that the leaves are off. Some pruning with the leaves on will not hurt. For clipping hedges see page 22.

Color

In the choice and arrangement of plants the color scheme should be given careful consideration. In the accompanying fig. 4, in which the colors green, yellow, orange, red, blue and purple are arranged in a circle, the colors opposite each other are complementary, in other words harmonize, whereas those close together are discordant.

When schoolhouses are of red brick, as so many are, reds and pinks should be avoided unless they are modified by an intervening background of green foliage or white flowers.

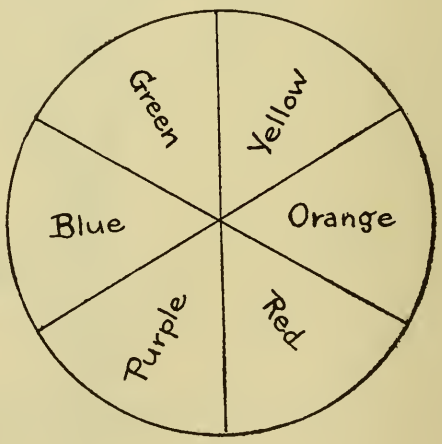


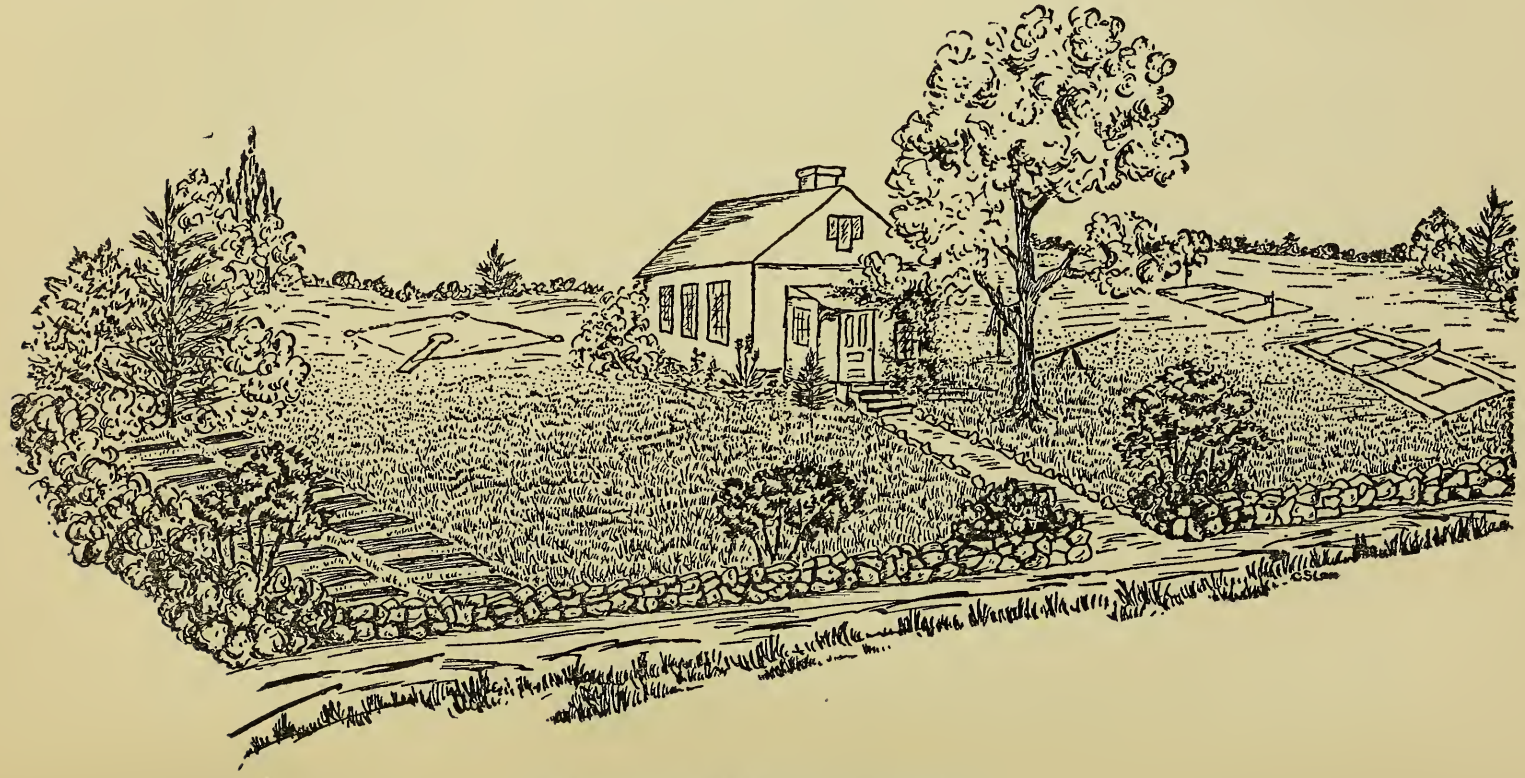
FIG. 4

Do not try to represent every color in the area devoted to decorative planting. Choose one color for your dominating note, blue for instance; find its complementary color, which is orange. Touches of orange will emphasize the blue and still give harmony and beauty to the color scheme. This is especially important where the colors are in close proximity. Where there are stretches of green and bits of foliage to soften the harshness of clashing combinations, or masses of white to eliminate them, the rule of complementary colors does not have to be adhered to quite so strictly to insure a harmonious and pleasing effect.

PLATE 5

RURAL SCHOOL BEFORE IMPROVEMENT

PLATE 6



RURAL SCHOOL AFTER IMPROVEMENT

The Use of Scientific Names

The use of scientific names in addition to the popular names may seem superfluous, hence the need of a word of explanation. An exclusive use of popular names brings about great confusion, since in different sections of the country the same name is often applied to many different species. Take the pine family for example: of the thirty-nine species in the United States nine different ones are called spruce pine, six are called yellow pine; the long-leaf pine of the coastal plain (*Pinus palustris*) has twenty-seven different popular names. There is a western pine which, among other names, is called brown-bark pine, yellow pine, red pine and black pine.

Accuracy in nomenclature is particularly important in dealing with nurseries. In ordering an oak, for instance, you might be sent any one of the twenty-four species that are native to this state; by specifying laurel oak you might either get that or the shingle oak, also called laurel oak, but if you say *Quercus laurifolia* there will be no mistake. Use the scientific name in ordering from nurseries. Our book, The Trees of North Carolina, listed on p. 48, should enable any educated person to find the names of the trees without any difficulty.

The scientific naming of plants is not entirely a bit of imagination, though some of it is. Many plants are named for their qualities, but many are named for men or states or countries, and some even for sentimental reasons, as to compliment a sweetheart.

Carolus Linneaus, the great Swedish botanist, and founder of botanical nomenclature, named many of our plants that were sent to him by collectors of early days. He used every possible consideration in naming plants, frequently as a compliment to his friends, and often to perpetuate the names of collectors or states. But often he was purely fanciful, and sometimes perpetrated jokes with his naming, as in the case of a genus of flowers, some of them wild here, that is closely related to the *Wandering Jew*. They have pretty blue flowers that are conspicuous along embankments in our mountains. In studying the flowers of one of these plants Linneaus found that they had two kinds of stamens; some perfect that produced pollen, and others sterile that produced nothing. When he saw this it reminded him of three Dutch friends of his named Commelin. They were brothers and all botanists. Two of them were energetic men, and published a good deal of botanical investigation. The other brother was intelligent but too lazy to publish

anything. He would not take that much trouble. So Linneaus named this plant *Commelina* after the Commelin brothers, which were also of two kinds, fertile and sterile.

THE PERGOLA OR ARBOR

Besides the trees and shrubs that enhance the beauty of grounds a pergola should be considered. In a garden it is somewhat of a luxury, but it can hardly be thought of as such on school grounds. Many of our school children come from such a distance that they must bring their lunch with them. Since we realize that it is absolutely necessary to have the children out of doors and the building aired during every recess, this means that the child must find some place on the school grounds to eat his midday meal. Leaning up against the building in a hot sun to eat is neither pleasant nor restful. A long simple vine-covered pergola would solve this problem. Here the children could spend a quiet noon hour eating their lunch in peace and protection from the sun. The expense of such a pergola can be reduced to a minimum if cedar or cypress logs are contributed by various parents and the manual training class builds it. People will be glad to contribute vines such as *wisteria,* which will transform the pergola into one of the most beautiful as well as one of the most useful features of the grounds. Other vines well suited for the pergola are *yellow jessamine, trumpet vine, cross vine,* wild or cultivated *grapes* and climbing *roses* (see fig. 5). For details of the design see Plate 12. If trash containers are placed in the pergola it will help to eliminate the papers and scraps, results of this meal that one so often sees scattered over the grounds. These should be inconspicuous in color and shape and placed beside the posts at frequent intervals.

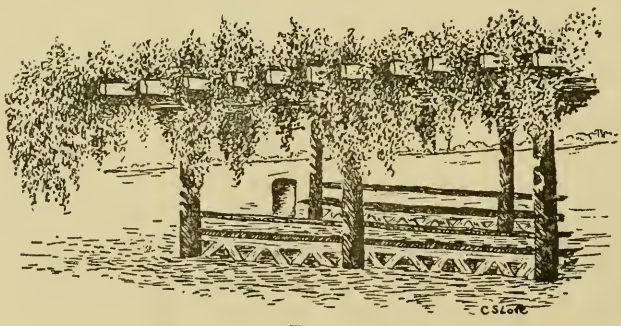


FIG. 5

SCHOOL GARDENS

Almost as important as the school grounds themselves is the school garden. Here each child can experiment for himself in the growth of vegetables and flowers. A task that seems mere drudgery at home may be a pleasure when it is part of a competition with friends. Even if a child raises only one thing and does that well he has gained in knowledge and practical experience. A row of well grown lettuce may be quite as valuable to him or her as a perfect arithmetic lesson. It is surprising how few kinds of vegetables are planted in the average country garden. Such fine and useful things as *asparagus, lettuce, spinach, salsify* (oyster plant), *carrots, egg plant,* and *brussels sprouts* are very rarely seen. It is well worth while to use the school garden to familiarize the children with the culture and use of these and other good vegetables.

There are several vegetables that, if planted in September, will mature before the end of the school year, and the children will get the full benefit of their labors. *Lettuce, turnips, mustard, radishes, carrots, peas* and *spinach* will all be ready in the spring if given an early start. The child's pride in successful results and the experience gained from mistakes will be well worth the trouble and slight expense necessary. If land is available the expense can be reduced to the cost of the seed, a few simple tools, and some manure or fertilizers which the parents might be persuaded to contribute. Some of the children might obtain a great deal of pleasure from a cold frame constructed of bricks or planks and panes of glass.

There are also hardy herbaceous perennials, flowers that are well worth a place in the school garden both for their beauty in the garden itself and for their value as cut flowers in the school room, which is too often devoid of anything decorative. Of the rather few that blossom before the end of the school year some of the best and easiest to grow are *nasturtiums, candytuft, yarrow, violets, pansies, cornflowers* and *poppies.* By planting bulbs in the fall the child can have a bright display of *hyacinths, jonquils, narcissus, tulips, crocuses, and snowdrops.* Plants like *candytuft* and *pansies* can be sown in boxes and kept in the school room until early spring. *Violets, hepaticas, daisies* and other familiar wild flowers may be dug up in the fall and will blossom in the spring.

A child that has had the responsibility of a bed of flowers or vegetables from germination to maturity, and produced results, has gained from his schooling something of which he himself can see the practical value. This will create or increase an interest in school work.

HEDGES AND HEDGE PLANTS

FIG. 6

Hedges or closely planted borders may either be clipped to an ordered form or allowed to grow freely. As clipping is labor we should plan a free hedge when it would serve equally well for use or effect. For screening ugly houses or unpleasant views clusters or rows of untrimmed plants do quite as well as, or better than, trimmed hedges. If it is important to have a boundary that will keep out animals or people, the growth can be made denser by severe clipping during the first few years, and thorny plants should be used as already mentioned. Most if not all the clipped privet hedges we see are not worth the labor they cost and are indeed far less beautiful as a rule than a hedge or boundary of some other sort that requires only a fraction of the care.

FIG. 7

FIG. 8

For the front boundary along the sidewalk or road there is nothing so good as a low wall of rock or brick. Behind this, if one wishes, may be planted a free hedge of *Thunberg's spirea* or *Thunberg's barberry* or a row of *iris* or *yucca.* If a wall cannot be afforded, it is along this front boundary that a low privet hedge is most in place. For boundaries between lots or to border paths it is much better to use *spireas, Japan quinces, lilacs, barberries, rugosa* or *spinossissima roses.* They need very little trimming to be kept in nice shape. A shortening of unruly branches once a year is enough (for best time for this pruning see page 18). *Box* or *arbor-vitae* are easily kept in formal shape with very little clipping. *Yuccas* or *iris,* which of course require no clipping, will also make a pretty division line or walk border. In the coastal region a beautiful

FIG. 9

hedge can be made of *wax myrtle* or of *yopon,* the latter requiring clipping if a dense hedge is desired.

In clipped hedges the shapes most used are shown in figures 7 to 10 from end view; square top and sides (fig. 7), symmetrically rounded (fig. 8), arched to a ridge (fig. 9), slanting top with flat sides (fig. 10). Probably the best form, considering looks, labor and upkeep and healthy growth of the plant, is the arched shape (fig. 9).

Fig. 10

Figures 6, 11 and 12 give side views of different forms: the simple level line of fig. 12, the square extension blocks at regular intervals of fig. 11, and the very effective insertions in the hedge of pyramidal conifers such as *arbor-vitae* at regular intervals (fig. 6). Rapid growing hedges like *Amoor River privet* (so-called, *Ligustrum chinense,*) must be clipped several times during the growing season if they are to be kept dense and neat.

Fig. 11

Fig. 12

Below are listed the best available hedge plants for our state:

Japanese Barberry (*Berberis Thunbergii*). The best shrub for a low, unclipped hedge in the middle and western sections. Very healthy and hardy, it has the further advantage of small, dense foliage which turns to beautiful colors in the fall, and of bright red berries for winter color. The abundant prickles are very discouraging to unwelcome animal visitors.

Box (*Buxus sempervirens* and the dwarf variety.) The box is too well known to need description. For permanence and dignity there is no evergreen shrub that can quite take its place and it is only to be feared that in this restless age it will too often be neglected for other quicker growing but inferior plants.

Trifoliate Orange (*Citrus trifoliata*). An excellent hedge plant for boundaries, as its formidable thorns will turn both man and beast. It is decorative at all times of the year, bearing fragrant white flowers in spring, showy, yellow, inedible oranges in the fall, with its green stems conspicuous in the winter. It is about ten to fifteen feet high, if allowed to grow freely, but may be kept down and made denser by clipping.

Japanese Quince (*Pyrus japonica*). Among the few good spiny hedge plants this stands among the very best. It is very strong and permanent, hard to penetrate, and if the best varieties are chosen it is one of the most brilliant of all shrubs when in flower. The kinds that flower before the

leaves appear are much superior to the commoner kinds with flowers among the leaves. There are a good many varieties of the better sort varying from brilliant scarlet to white, but unfortunately they are rarely offered by Southern nurseries in a discriminating way.

JAPANESE EUONYMUS (*Euonymus japonica*). This excellent old favorite is much used in the South for evergreen hedges and few things are handsomer than a well-kept euonymus hedge. The reputation of the plant for freedom from disease has recently been rudely upset by the introduction of a most destructive scale insect which kills it in a few years when present. One of the saddest tragedies we have ever seen in gardening was the complete destruction of all the euonymus hedges in Chapel Hill within the last two years.

YOPON (*Ilex vomitoria*). A small slender evergreen tree, native to our coast. Leaves small, berries red. Does well in cultivation, at least as far west as Chapel Hill, but is apt to be straggling in shape. As a hedge plant it is one of the best for the coastal plain, as clipping corrects its straggling habit and transforms it into a dense hedge.

CAROLINA LAUREL CHERRY (*Laurocerasus caroliniana*). This is a small tree that is well known in the coastal plain as a fine evergreen for screening outbuildings or for a specimen on the lawn. It is too strong a grower to be kept back closely by clipping, but as a free hedge for boundaries or screens there is nothing quite so good and it has the further recommendation of being a native of our state. If planted in a row by a walk (about 3 ft. apart and 4 ft. from the walk) it can be clipped on the walk side until about 7 ft. high, then allowed to grow over the walk, resulting in a fine effect. The same treatment may be followed in the case of yopon. The abundant black and bitter little cherries that it bears are much liked by the cedar waxwings.

JAPANESE PRIVET (*Ligustrum Japonicum Nepalense*). A dwarfish variety of the Japanese privet that is very good for a clipped hedge or an uncontrolled specimen. When unclipped it has a pleasing irregularity and is fine for planting against the house foundations.

AMOOR RIVER PRIVET (*Ligustrum chinense*). This is the most popular hedge plant in our state and where a formal hedge is needed it is good. When clipped it is entirely evergreen in Chapel Hill. The common name of the plant should be Chinese privet, the real Amoor River Privet being *Ligustrum amurense*, but the latter name has become so widespread that to change it here would cause confusion.

REGEL'S PRIVET (*Ligustrum Ibota Regelianum*). Of all the deciduous privets this is the best as a decorative shrub. The spreading habit is much more pleasing than the stiff upright form of other sorts and its strong growth and compactness make it most desirable in mass planting.

QUIHOUI PRIVET (*Ligustrum Quihoui*). An evergreen privet with small, narrow, dense leaves and tall habit that is one of the very best evergreens we can use for a screen or for mass planting. There is nothing better as a screen for small outhouses.

Japanese Rose (*Rosa rugosa*). The peculiar foliage of the Japanese rose is particularly charming and its dense habit fits it for hedges. Among the best varieties are Blanc Double de Courbet, Conrad Ferdinand Meyer, Mme. Georges Bruant, Nova Zembla.

Scotch Rose (*Rosa spinosissima*). The remarkably dense habit and delicate leaves of this vigorous shrub make it one of the best spiny hedges. The small but very numerous white or pink flowers nearly cover the plant in April. It spreads by underground runners and has to be kept in check. It is excellent for bordering fences or planting along the corners of walks.

McCartney Rose (*Rosa bracteata*). This is a very strong and vigorous rose with long arched, very prickly branches and large single white flowers. It is distinguished from the Cherokee, with which it is often confused, by the larger number of leaflets (5-7 instead of 3) and the large green bracts beneath the flower. As an untrimmed or sparingly clipped hedge it is very useful, and it is fine in a group on the lawn.

Bridal Wreath (*Spirea prunifolia* and the var. *flore pleno*). This old favorite well deserves its great popularity. For fighting power under adverse conditions it is remarkable and as a hedge in shade and among tree roots has no equal. The flower buds are never killed by cold and never fail. The color of the leaves in fall is fine and the habit of suckering around the base makes it easy to increase and therefore obtainable from neighbors as a rule without cost.

Thunberg's Spirea (*Spirea Thunbergii*). This species is coming into great favor as a hedge and border shrub and for planting against the house. Of small to medium size and very delicate, graceful, arching habit, it is always beautiful. The pure white, delicate flowers cover the branches in early spring and are wonderfully effective. In fall the leaves change to the most beautiful and varied tones of orange, bronze and red. For best effect this shrub should be clipped back every year or second year to give denser habit.

Van Houtte's Spirea (*Spirea Van Houttei*). A beautiful strong plant that deserves to stand among the four or five best shrubs for general uses. It is arched and graceful in shape and is covered with masses of white flowers in early spring.

ARBOR DAY

The general conception of Arbor Day makes it a day for planting trees; this literal interpretation should give way to a much broader and more inclusive one. If the grounds are without trees plant some by all means, but if there are enough trees plant shrubs on Arbor Day, and if the grounds abound in shrubs then plant perennials like *irises* and *peonies*. If the goal toward which the planting plan has pointed has been reached and your trees, shrubs and vines and perennials have all been planted in their proper places, even then Arbor Day can and should be observed, for once a plant is in the ground one's duties toward it are not ended; it still needs care and food. Organize the school into squads, some to rake or mow the lawn, others to clip and prune, and others to give the plants the much needed fertilizers. In this way Arbor Day will pass leaving the grounds more beautiful, either as a result of a general clean up or increased planting, besides renewing interest and enthusiasm in the young people.

NURSERIES

The plants that are not native and therefore cannot be found in the woods and fields must be either secured by individual contributions or bought from a nursery. In buying from North Carolina nurseries one is more apt to get varieties adapted to the climate. Moreover, several important North Carolina nurseries have offered to sell to the schools at reduced rates. For names of nurseries write us.

LANDSCAPE ARCHITECTS

The South is rapidly growing in wealth and ambition and is now a promising field for the professional landscape architect. The disordered and adventitious growth of nearly all of our communities, rural or urban, with no realization of or provision for the most elementary social or civic needs of the people can be corrected only by a careful consideration of such needs and the adoption of a comprehensive plan for growth and alteration. To formulate such a plan it is imperative that an architect of ability and experience be employed. Such an architect is also needed in all important developments of institutions, parks, large school properties, private grounds, etc.

We can furnish the names of competent landscape architects on inquiry.

PLATE 7

WINTER SCENE IN YARD OF W. C. COKER

CHAPEL HILL, N. C.

a—White Pine. *b*—Hemlock. *c*—Cedar. *e*—White Oak.

WHAT TO PLANT IN EACH SECTION OF THE STATE

We give below a short list of the plants we consider the most desirable and easily obtainable for each section of the state. The word native here means that they are native to that section of the state in which they are listed. Others, often equally as good, are given in the longer lists that follow. We have not added deciduous shrubs to the short special lists, because so many of them are good throughout nearly the whole state. The longer descriptive lists (p. 31) will give scientific names and will warn against those unfitted for certain sections.

Eastern Section

Broad-leaved Evergreen Trees

Magnolia—Native
Live Oak—Native
Holly—Native
American Olive—Native
Mock Orange—Native
Japanese Oak
Photinia

Coniferous Evergreens

Long-leaf Pine—Native
Short-leaf Pine—Native
Loblolly Pine—Native
Red Cedar—Native
Norway Spruce
Deodara Cedar
Incense Cedar
American Arbor-vitæ
Oriental Arbor-vitæ
Cunninghamia lanceolata
Cryptomeria japonica
Fortune's Yew

For the warmer coastal strip the following might be added:
Loquat
Camphor
Palmetto—Native

Deciduous Trees

Cypress—Native
Black Willow—Native
Black Walnut—Native
White-heart Hickory and others—Native
Red Birch—Native
Beech—Native
White Oak—Native
Scarlet Oak—Native
Willow Oak—Native
Laurel Oak—Native
White Elm—Native
Hackberry—Native
Sweet Bay—Native
Tulip Tree—Native
Sweet Gum—Native
Honey Locust—Native
Ash-leaved Maple—Native

Deciduous Trees—Continued

Kentucky Coffee Tree
Ginkgo
White Willow
Yellow Willow
Weeping Willow
Bay Willow
Pecan
Soulange's Magnolia
Mimosa
Crape Myrtle
Japanese Cherry
Redbud—Native
Red Maple—Native
Dogwood—Native
Black Gum—Native
White Ash—Native

Evergreen Shrubs and Canes

Dwarf Palmetto—Native
Wax Myrtle—Native
Yopon—Native
Gallberry—Native
Yuccas—Native
Sweet Olive
Holly-leaved Olive
Banana Shrub
Japanese Laurel
Quihoui Privet
Pittosporum
Oleander
Mahonia japonica
Camellia japonica
Gardenia
Tea
Viburnum tinus
Rosemary
Lavender
Bamboos

Middle Section

Broad-leaved Evergreen Trees

Magnolia—Native
Holly—Native
Photinia

Coniferous Evergreens

Loblolly Pine—Native
Oldfield Pine—Native
Jersey Pine—Native
Red Cedar—Native
Hemlock—Native
Norway Spruce
Colorado Spruce
Oriental Spruce
White Fir
Douglas Fir
Nordman's Fir
American Arbor-vitæ
Oriental Arbor-vitæ
Chinese Juniper
Cedrus atlantica
Deodara Cedar
Incense Cedar
Cunninghamia lanceolata
Cryptomeria japonica
Japanese Yew

Deciduous Trees

Cypress—Native
Black Willow—Native
Large-leaved Poplar—Native
White-heart Hickory
and others—Native
Black Walnut—Native
Red Birch—Native
Beech—Native
White Oak—Native
Red Oak—Native

Deciduous Trees—Continued

Scarlet Oak—Native
Willow Oak—Native
Pin Oak—Native
White Elm—Native
Ash-leaved Maple—Native
Ginkgo
White Willow
Yellow Willow
Weeping Willow
Bay Willow
Soulange's Magnolia
Buckeye—Native
Linden—Native
Dogwood—Native
Black Gum—Native
Sourwood—Native
White Ash—Native
Mimosa
Crape Myrtle
Kentucky Coffee Tree
Black Locust
Japanese Cherry
Large-leaved Poplar
Laurel Oak
Hackberry—Native
Tulip Tree—Native
Sweet Gum—Native
Honey Locust—Native
Redbud—Native
Red Maple—Native
Sugar Maple—Native

Evergreen Shrubs and Canes

Rhododendrons—Native
Kalmias—Native
Yuccas—Native
Pittosporum—Native
Mahonia japonica
Quihoui Privet
Yopon
Japanese Holly
Sweet Olive
Holly-leaved Olive
Rosemary
Lavender
Bamboos

Western Section

Broad-leaved Evergreen Trees

Holly—Native

Coniferous Trees

White Pine—Native
Short-leaf Pine—Native
Mountain Pine—Native
Jersey Pine—Native
White Spruce—Native
Black Spruce—Native
Red Cedar—Native
Hemlock—Native
Carolina Hemlock—Native
Fraser's Fir—Native
Nordman's Fir
Douglas Fir
Norway Spruce
Colorado Spruce
Oriental Spruce
American Arbor-vitæ
Oriental Arbor-vitæ
Chinese Juniper
Incense Cedar
Cunninghamia
Japanese Yew

Deciduous Trees

Black Willow—Native
Large-leaved Poplar—Native
Black Walnut—Native
White-heart Hickory
and others—Native
Red Birch—Native
White Birch—Native
Cherry Birch—Native
Beech—Native
White Oak—Native
Red Oak—Native
Tulip Tree—Native
Sweet Gum—Native
Redbud—Native
Yellowwood—Native
Black Locust—Native
Sugar Maple—Native
Red Maple—Native
Buckeye—Native
Linden—Native
Dogwood—Native
Sourwood—Native
Silver Bell—Native
White Ash—Native
White Willow
Yellow Willow
Weeping Willow
Bay Willow
Kentucky Coffee Tree
Crape Myrtle
Japanese Cherry

Evergreen Shrubs and Canes

Rhododendrons—Native
Kalmias—Native
Yuccas
Pittosporum
Quihoui Privet
Japanese Holly
Mahonia japonica
Rosemary
Lavender
Bamboos

PLATE 8

SCENES IN THE UNIVERSITY ARBORETUM
CHAPEL HILL, N. C.

ORNAMENTAL TREES, SHRUBS, VINES, AND FLOWERS

Broad-Leaved Evergreen Trees

Live Oak (*Quercus virginiana*). Its wide spreading crown, strong branches and small dense evergreen leaves make an old live oak one of the most picturesque objects in the southeastern states. It is native to our coast and often draped with grey moss. It does well at least as far west as Chapel Hill.

Japanese Oak (*Quercus acuta*). For the coastal plain this recently available small oak has proved of exceptional value. Its dense, shining leaves, rounded crown and healthy growth fit it to take the place here that the holly-leaved oak or "*Ilex*" of the Mediterranean region fills there. A long walk bordered with this oak would give distinction to any grounds. It is best not to prune this at all as it will make a good head anyway and we find that cut branches are apt to be infected and killed by a fungus (*Endothia gyrosa*), related to the chestnut blight.

Loblolly Bay (*Gordonia Lasianthus*). A medium-sized evergreen with a narrow compact head and conspicuous white flowers, found along edges of bays and in parts of the coastal plain. A very beautiful tree, but it does well in cultivation only when its natural habitat is duplicated.

Red Bay (*Persea pubescens*). A small tree of the eastern swamps with long, shiny green leaves and small creamy flowers. It is well adapted for damp, sandy soil in the eastern part of the State.

Dahoon Holly (*Ilex Cassine*). A small slender evergreen tree, native of swamp margins near the coast with thick leaves and persistent red berries. Quite ornamental and worthy of cultivation in the coastal region.

Mock Orange or Carolina Laurel Cherry. See hedge plants (p. 22.)

Yopon. See hedge plants (p. 22.)

American Holly (*Ilex opaca*). A well known tree with thick spiny evergreen leaves and red berries. Once common throughout the State, but now becoming much scarcer through the destructive work of Christmas berry hunters. Even in home grounds it is often raided by vandals. It is especially suited to damp, sandy soil.

Magnolia (*Magnolia grandiflora*). A magnificent evergreen with large, shiny, deep green leaves and large fragrant white flowers which open in June.

Devilwood, Wild Olive (*Osmanthus americanus*). A small evergreen tree of the coastal region. Fruit resembles a small olive. Flowers small but abundant and fragrant. A very attractive tree in cultivation.

Loquat, Japan Plum (*Eriobotrya japonica*). A small tree with thick, glossy green leaves that are rusty beneath; the large fragrant flowers in rusty woolly clusters appearing from summer till winter. The fruit, which is

good to eat, rarely matures in this state. A very desirable ornament for the coastal region, but not fully hardy at Fayetteville. It is fine as a single specimen on the lawn.

PHOTINIA (*Photinia serrulata*). A beautiful evergreen tree with a rounded head, dense, deep green shining leaves that turn red a few at a time before they fall. The flowers are small, whitish and borne in large, flat clusters at the tips of the branches. In winter the large buds are red and conspicuous in contrast with the green.

PALMETTO (*Sabal palmetto*). This striking subtropical tree is native to Smith Island in the extreme southeastern corner of the state and is hardy along a coastal strip including Wilmington and all of New Hanover and Brunswick. Within this area it should be used abundantly.

Coniferous Trees
(Most are Evergreen)

BALSAM, FRASER'S FIR (*Abies Fraseri*). A charming tree with fragrant leaves and upright cones. Native to the mountains and not successful in any other section of the state.

WHITE FIR (*Abies concolor*). A western species with light green leaves which withstand heat and drought best of all the firs. A hardy and rapid grower and one of the most useful firs throughout the state.

NORDMAN'S FIR (*Abies Nordmanniana*). Leaves dark green above, silvery white below; very hardy and desirable in all the sections; of slow growth, but long lived, dense and beautiful.

Cedrus atlantica. Large pyramidal cedar with glaucous green leaves. The branches are wide and spreading which gives it a very distinct appearance. Prefers well drained, loamy soil, and is good in all sections.

DEODARA CEDAR (*Cedrus deodara*). A rapid grower and one of the best evergreens for the coastal plain; leaves bluish green. Will succeed in all sections.

Cryptomeria japonica elegans. A small, dense, pyramidal tree of rapid growth with horizontal branches and drooping branchlets, the bright green leaves changing to bronze in fall and winter. Best in the middle and eastern sections.

Cunninghamia lanceolata. A tree with lance-like leaves on horizontal branches; a rapid and symmetrical grower attaining a good height, but the lower branches are not very persistent, which is a defect in a lawn conifer.

CHINESE JUNIPER (*Juniperus chinensis*). A pyramidal tree of grey green color and strong healthy growth that is not particular as to soil; one of the best dense conifers. The variety *procumbens* is a prostrate spreading form of this and according to our experience is the very best and healthiest conifer of this habit. It is very fine among or near rocks or margins of fountains.

RED CEDAR (*Juniperus virginiana*). A common native tree found in the woods throughout most of the state and transplanted without much difficulty. It is very variable in color, form and density. A deep green, dense tree full

PLATE 9

a *b* *c* *d* *e* *f*

ARBORETUM, UNIVERSITY OF NORTH CAROLINA

a—Weeping Willow. *b*—Cypress. *c*—Beech. *d*—Pin Oak. *e*—Old Field Pine (*P. Taeda*). *f*—Chinese Juniper.

of berries is a fine sight, but a straggling, yellowish, pollinate one may be anything but handsome. It should not be placed near apple trees as the orange balls produced in spring are a fungus disease which spreads to the apple trees.

Incense Cedar (*Libocedrus decurrens*). Tall, stately, of upright growth with beautiful dark green foliage. Very ornamental and one of the best conifers for the middle and eastern sections.

White Spruce (*Picea canadensis*). Foliage light bluish green, cones brown and glossy. In the mountains this does well and is of great beauty but it will not flourish elsewhere in the state.

Black Spruce (*Picea mariana*). A fine large tree native to the mountains with slender, often pendulous branches. It does not do well east of the foothills.

Norway Spruce (*Picea excelsa*). A tall, picturesque, spreading tree with drooping branches; hardy, graceful and of rapid growth. Makes a good windbreak and is far more adaptable and vigorous than our native spruces, succeeding even in the coastal plain.

Oriental Spruce (*Picea orientalis*). A very hardy and ornamental middle-sized spruce with dark, dense foliage. It will succeed at least as far east as Chapel Hill.

Bhotan Pine (*Pinus excelsa*). Forms a large irregular pyramid with bluish green leaves. The color is about that of the white pine and it is not subject to attack of the scale insects that infest and often ruin the latter. Succeeds in all sections.

Long-leaf Pine (*Pinus palustris*). A picturesque and decorative pine particularly valuable for the eastern part of the state where it is native and can therefore be procured without any expense. For transplanting see p. 14.

Mountain Pine, Pitch Pine (*Pinus rigida*). This is the common pine of our mountains and should be used for that section.

Loblolly Pine (*Pinus Taeda*). An attractive pine with long leaves, native in the eastern and middle sections of the state. A row of loblolly pines and native cedar makes an inexpensive screen to hide objectionable views.

Jersey Pine (*Pinus virginiana*). A native of the western and middle part of the state. It can be used with the loblolly pine to give variety.

Retinospora plumosa squarrosa. An interesting plant of small size and curious blue green, feathery looking foliage. Very effective in contrast to other forms.

Japanese Umbrella Pine (*Sciadopitys verticellata*). Of tall pyramidal habit with deep green needles in whorls. In age the branches become spreading or pendulous. Interesting for contrast and seems to do well in all sections.

Bald or Deciduous Cypress (*Taxodium distichum*). A tall, deciduous conifer of the coastal plain swamps with feathery foliage of great beauty. It sends up large knees around the trunk. This tree is particularly valuable for wet or moist land, but will do very well in rich, porous uplands.

ENGLISH YEW (*Taxus baccata*). A small tree forming a low broad head with dark green leaves. If the conditions are just right it does well, but as a rule is short lived in our state.

JAPANESE YEW (*Taxus cuspidata*). This is better adapted to our conditions than the above and is a very fine small tree or shrub for lawns or borders. The variety *nana* is a good dwarf form of this.

FORTUNE'S YEW (*Cephalotaxus Fortunei*). A small, sturdy, spreading bush or tree that is good against the house or in angles of walks. It is odd in having a plum-like fruit.

CANADIAN HEMLOCK (*Tsuga canadensis*). A very fine and graceful tree, native to our mountains, and one of the five or six best conifers for general use. It also makes a good trimmed hedge.

CAROLINA HEMLOCK (*Tsuga caroliniana*). Smaller than the *Canada hemlock* and more rigid in outline. While beautiful and interesting it is of much slower growth than the preceding and far less reliable out of the mountain section. Should be used freely from the center westward.

AMERICAN ARBOR-VITÆ (*Thuja occidentalis*). A small tree of a narrow, pyramidal, rather compact form; useful for formal planting for gardens or for path borders; succeeds in all sections. There are a number of varieties for special uses. Some of the best are: var. *pyramidalis*, very narrow and formal; var. *globosa*, small and compact; and var. *filicoides*, broadly pyramidal with crested, fern-like foliage.

ORIENTAL ARBOR-VITÆ (*Thuja orientalis*). Much like the above and succeeds in all sections. Among the many varieties several of importance are var. *compacta*, small, dense and bright green; var. *aurea nana* (BERCKMAN'S GOLDEN ARBOR-VITÆ), a dwarf golden compact form; var. *pyramidalis*, very narrow, tall and formal; var. *Hoveyei*, a dwarf form, dense, ovate to globose, with bright green foliage.

Deciduous Trees

RED MAPLE (*Acer rubrum*). Good for moist places and any good soil; surpasses all other maples in beauty of flower and fruit and fall coloration. Middle and eastern.

SUGAR MAPLE (*Acer saccharum*). The longest lived of all our maples and the most desirable in cultivation; prefers rich uplands and cool mountain slopes. The tall and rather columnar form make it useful as an accent among lower and more spreading kinds. In Chapel Hill it is one of the healthiest trees we have and the autumn coloring is magnificent. As a street tree in the middle and western sections of our state it has few equals. Native.

ENGLISH FIELD MAPLE (*Acer campestre*). Small, dense, dark, symmetrical, campact; makes a pleasing contrast behind *sweet breath of spring*, *Van Houtte's spirea*, *forsythia*, etc. As a specimen tree for the lawn it has everything to recommend it except the inconspicuous flowers. Middle and western.

ASH-LEAVED MAPLE, BOX ELDER (*Acer negundo*). A small tree of wide spreading, rapid growth. Valuable for quick shade. Throughout the State.

Norway Maple (*Acer platanoides*). A good street and lawn tree; leaves golden yellow in the fall. Throughout the State.

European Horse Chestnut (*Aesculus hippocastanum*). Symmetrical, dense; flowers white, showy. Excellent for lawns in the eastern and middle sections. The var. *flore pleno* has double flowers which hold longer before fading. Our mountain species, *Aesculus octandra*, is also fine and should be used in the western section. *Aesculus rubicunda*, of garden origin and about the same habits, is popular.

Mimosa Tree (*Albizzia julibrissin*). Beautiful both for its graceful feathery foliage and its numerous delicate fragrant flowers; forms a low flat topped crown and in all gives a decidedly subtropical effect. Valuable for the eastern and middle sections.

Chinese Angelica Tree (*Aralia chinensis*). A small tree with huge leaves and flower heads borne on the ends of slender stems. Does well in all sections.

European White Birch (*Betula alba*). Delicate, graceful, with white bark and spreading, pendulous branches. Except in the mountains it should be planted only in moist places, and even then its life is precarious. Excellent for planting among evergreens. The cut-leaved variety, *laciniata gracilis pendula*, is of even more delicate beauty.

Cherry Birch (*Betula lenta*). A good round-headed tree for the mountains. Native.

Red or River Birch (*Betula nigra*). A moisture-loving, tall, graceful tree; good for swampy land or along streams at any place in the state. Native.

Western Catalpa (*Catalpa speciosa*). While not of the first class for beauty this is useful for filling in bare places and borders. The trunks make most desirable posts and after ten or fifteen years superfluous trees may be used for this purpose.

Nettle Tree or Sugarberry (*Celtis occidentalis*). A good tree that does well all over the state in almost any soil. Native.

Redbud or Judas Tree (*Cercis canadensis*). One of the most beautiful of our native flowering trees; covered with clusters of purple flowers in early spring before the leaves come out.

Black Walnut (*Juglans nigra*). A handsome well known native tree that does well throughout the state.

White-heart Hickory (*Hicoria alba*). A tall short-limbed tree with large leaves that turn a beautiful yellow in the fall. Common throughout the state and one of the best trees for school grounds. The *pig-nut*, *shell-bark* and other hickories are also good.

Pecan (*Hicoria pecan*). This fine healthy nut and shade tree should be much more often planted. It prefers the deep loamy soil of river bottoms in the coastal plain, but will grow well in uplands throughout the middle sections.

YELLOW-WOOD (*Cladastris lutea*). A very handsome tree in cultivation forming a symmetrical rounded head. The flowers are white, fragrant, drooping and much like wisteria. Native to the mountains and not of much value except in or near them.

WHITE ASH (*Fraxinus americana*). Very tall and healthy and popular as a lawn or street tree. The *green ash* is also good.

BEECH (*Fagus grandifolia*). A handsome native tree with smooth, grey bark found along brooks throughout most of the state. Where a dense shade is not objectionable or along smaller boundaries or as a single specimen on the lawn there are few trees more beautiful or permanent.

EUROPEAN BEECH (*Fagus sylvatica*). This is very like our own beech and can be used in similar ways. Its variety *asplenifolia* or *cut-leaved beech* is dense, low and unsurpassed in beauty of form and foliage. The variety *purpurea* differs from the species in its dark purple leaves and is the best tree of this striking color.

KENTUCKY COFFEE TREE (*Gymnocladus dioica*). A desirable shade tree, free from disease and graceful in appearance; leaves very large and compound. May be planted in any fair soil and is good for city streets.

HONEY LOCUST (*Gleditsia triacanthos*). A well known thorny tree with spreading branches and an open feathery foliage that casts a light shade.

MAIDENHAIR TREE (*Ginkgo biloba*). A tall hardy tree with horizontal branches, native of China. Very unusual and picturesque and should be planted for its great botanical interest as it is unlike any other living tree.

SILVER BELL, SNOWDROP TREE (*Halesia tetraptera*). A small native tree that is covered with very lovely white flowers borne in the middle of May before the leaves. It does not thrive well except in or near the mountains and prefers deep, rich soil in somewhat sheltered places.

CRAPE MYRTLE (*Lagerstroemia indica*). The magnificent flowers and fine autumn colors make this one of the most desirable of small trees. There are at least five varieties of flower colors, deep pink or water melon color, lighter pink, pinkish purple, darker purplish (magenta) and white. Of these the ones without purplish tint are most beautiful. In planting one should try to plant shoots from a tree that is known to be of good color. Shoots from the roots can usually be found and can be made to form more abundantly by cutting some of the roots with a spade at some distance from the tree.

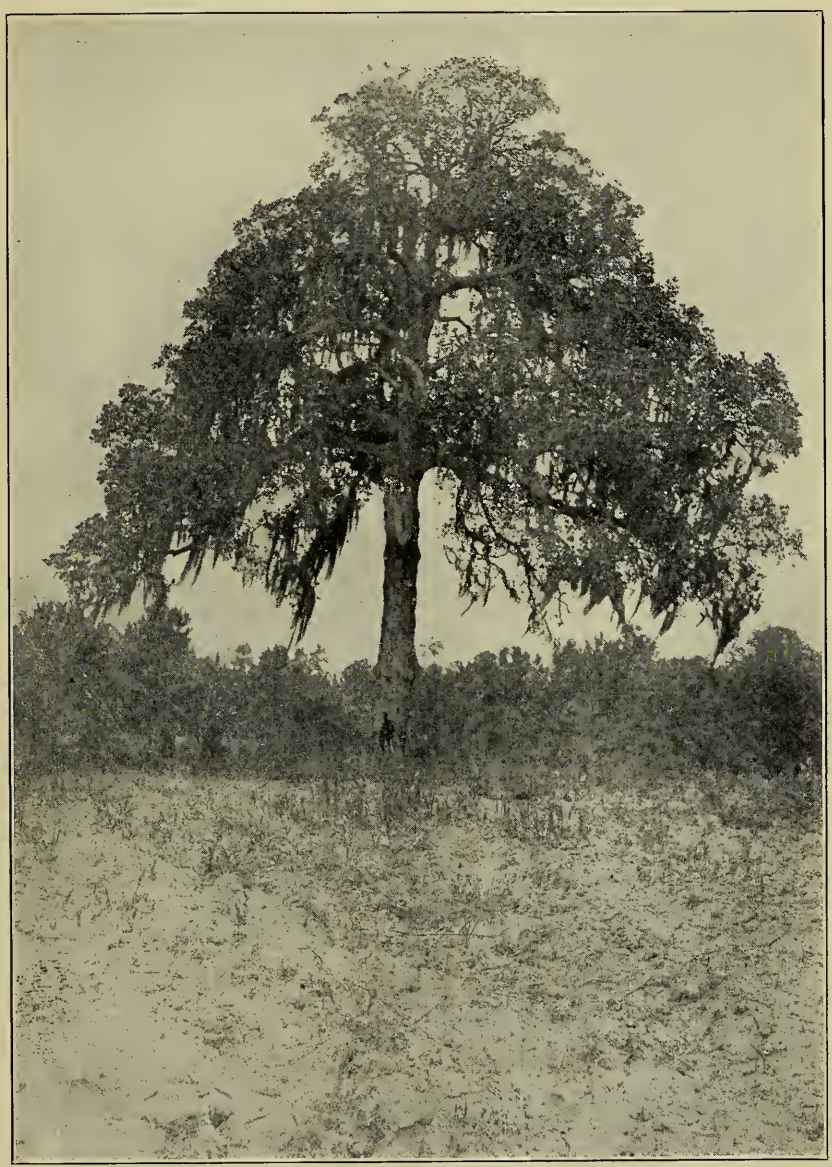
SWEET GUM (*Liquidambar styraciflua*). Tall, very healthy and with a fine fall color. Adapted to poorly drained soil where most trees fail. Native.

TULIP TREE OR POPLAR (*Liriodendron tulipifera*). Very large and beautiful and a rapid grower; valuable for its foliage and tulip shaped flowers.

SOULANGE'S MAGNOLIA (*Magnolia Soulangeana*). A beautiful small oriental tree with large very abundant purple and white flowers appearing before the leaves in early spring. Will stand damp soil and is a great favorite.

SWEET BAY (*Magnolia virginiana*). A small tree of the coastal plain found in swamps or moist places, therefore valuable for wet ground in decorative

PLATE 10



OLD MAGNOLIA WITH SPANISH MOSS

This venerable tree stands in the old neglected garden of André Michanx, established near Charleston, S. C., in 1787. From this garden Michanx introduced into France many of the finest trees and shrubs of the United States. See Journal E. Mitchell Sci. Soc., Vol. 27, Plate 10, July, 1911.

planting. Flowers white and very fragrant. This should be used much more as it is very satisfactory in cultivation.

Black Gum (*Nyssa sylvatica*). A native tree adaptable to any soil and especially useful for wet places; the autumn color is brilliant.

Sourwood (*Oxydendron aboreum*). A small tree turning a vivid red in the fall; the flowers recalling *lily of the valley*, appearing in late spring or summer. The tree is not adapted to open situations and it prefers wood conditions with a mulch of rotting leaves in cool soil; it appears to best advantage in front of evergreens.

Carolina Poplar (*Populus caroliniensis*). A straight rapid growing tree making an upright head. For quick shade and effect this is much used and is desirable. As a permanent tree it is inferior on account of its short life and lack of character. The very early fall of the leaves is another defect. The *Volga Poplar* sold by a few nurseries is much like it and is said to hold its leaves much longer.

Lombardy Poplar (*Populus nigra-italica*). A strikingly picturesque tree of tall, narrow habit, very rapid growth and very useful for breaking monotonous lines and for softening the corners of tall buildings. It is not very long-lived in America and rarely lasts in good condition for more than thirty or forty years.

Japanese Cherry (*Prunus Sieboldi*). The Japanese flowering cherry is famous for its beauty in Japan and is now being much used in this country. For early spring display they are very fine and are worth trying. Among the most beautiful varieties are *alba flora plena*, *Shirofugen*, *Hizakura*, *Mouut Fuji*, *Oku-myako*.

White Oak (*Quercus alba*). This grand native tree is considered by many to be the most majestic of all oaks. In Chapel Hill we have nothing to equal it and anyone who has seen a full grown, massive white oak in all its strength and dignity will know what a tree can stand for in the life of a people. It is folly to plant greatly inferior things to the exclusion of this oak just because they are supposed to grow faster. A single fine white oak is worth more as an inspiration than a whole forest of *poplars*, *china-berries* or *paulonias*.

Scarlet Oak (*Quercus coccinea*). This fine native oak is of good form and very fine foliage which turns brilliant scarlet in fall. It is not among the very long-lived species, but is good for variety and fall color and especially useful in rather poor, rocky uplands.

Pin Oak (*Quercus palustris*). A tall, symmetrical, pyramidal tree retaining its lower branches to the ground, a habit which makes it unique and especially desirable as a lawn specimen. It has also been proved to be very good for a street tree. Until recently this tree has not been known to be native to North Carolina, but it has now been found to be not rare in the swamps near Chapel Hill.

Willow Oak (*Quercus Phellos*). A large tree with leaves resembling those of a willow. Easily obtainable in the woods and one of the three or four

most ornamental and satisfactory of our oaks. It is especially suited to low, moist places, but does well in any good soil.

LAUREL OAK, DARLINGTON OAK (*Quercus laurifolia*). In many respects this is one of the very finest oaks in America. Our photograph (Pl. 4) shows the fine symmetry and form of the young tree which is retained for many years, indeed for life if not crowded. In the Pee Dee section of South Carolina and in parts of eastern North Carolina it is much used for streets and lawns and is partly evergreen.

RED OAK (*Quercus rubra*). A large, majestic oak which for richness of foliage is scarcely equalled by any other. It is native to the middle and western districts and is occasionally found on the coastal plain.

BLACK LOCUST (*Robinia Pseudo-acacia*). A rather small tree with beautiful fragrant racemes of white flowers which greatly resemble those of wisteria. It is native to our mountains and is especially good in borders here and there on account of its sweet flowers.

WHITE WILLOW (*Salix alba*). A strong tree with silvery grey leaves. One of the best of the willows and fine in damp places and in contrast with black and yellow willows.

WEEPING WILLOW (*Salix babylonica*). This well known tree is very picturesque and effective and is particularly good along the edges of ponds.

BLACK WILLOW (*Salix nigra*). A very good tree to use in moist or swampy places as it can be found along streams throughout the state. The delicate light green foliage makes a fine contrast with other trees.

BAY or LAUREL-LEAVED WILLOW (*Salix pentandra*). A small tree or shrub with large, dark green, shining leaves. Very decorative for planting in front of large willows with different colored foliage.

YELLOW WILLOW (*Salix vitellina*). A fine tree for wet places. Bark a conspicuous yellow in winter and very attractive if contrasted with evergreens or red and white barked trees.

LIME, LINDEN, BASSWOOD (*Tilia americana*). A very handsome, healthy tree with large shining leaves and fragrant creamy white flowers which are very much sought by bees; a rapid grower and best adapted to the mountain and Piedmont sections.

WHITE OR SILVER LINDEN (*Tilia tomentosa*). Leaves dark green above and silver white beneath, forming a striking contrast. A very beautiful native tree for lawns in the middle and western sections.

WHITE ELM (*Ulmus americana*). Its plume-like form, hardiness and longevity make this one of the most popular shade and lawn trees, and in the south it has so far been nearly free from the destructive elm-leaf beetle. It should not be planted near sewers as its roots often fill them up.

FLOWERING DOGWOOD (*Cornus florida*). This beautiful tree well known to us all should be used abundantly in front of evergreens and at the back of borders. It prefers a moist soil and some shade.

Evergreen Shrubs and Canes

(See also Hedge Plants)

Rhododendrons. We have in our state five species of Rhododendron, *R. maximum*, *R. catawbiense*, *R. carolinianum*, *R. minus*, and *R. punctatum*. Of these the first two are the largest and most commonly cultivated. The second is one of the parents of many fine hybrids that are unsurpassed among evergreen shrubs. A few of the best of these hybrid varieties are *album elegans* (light blush changing to white, very large), *Boule de Neige* (white, early, small), *E. S. Rand* (rich scarlet, medium), *Everestianum* (delicate rosy lilac, spotted with yellow, small), *Kettledrum* (rich crimson suffused with purple, large).

Kalmia, Mountain Laurel (*Kalmia latifolia*). This fine shrub succeeds very easily in the mountains in almost any soil except lime where the ground is not too wet, and it is also adapted to cultivation in other parts of the state if its needs are intelligently met (see p. 14).

Japanese Laurel (*Aucuba japonica*). A slow growing shrub with glossy leaves and handsome red berries on the pistillate plants. It endures smoke and dust and is valuable in large cities where few things do well. It is good in evergreen beds either alone or in front of taller sorts. Like the holly the plant is of two sexes and only the female bears berries. A variety of this is the *Gold Dust Tree* (var. *aurea maculata*) of more rapid growth and the leaves spotted with yellow. Middle and eastern sections.

Japanese Pittosporum (*Pittosporum Tobira*). A winter flowering shrub with very dense, dark green leaves; flowers pure white and fragrant. A very handsome evergreen of great permanence and value in the middle and eastern sections.

Oleander (*Nerium oleander*). An old-fashioned shrub with single or double flowers in various colors. Easy to grow and withstands the dust and smoke of cities well, but only half hardy away from the coast.

Wax Myrtle (*Myrica cerifera*). A shrub with narrow fragrant leaves and with wax-coated, bluish white berries; native to the coastal plain. This should be much used for hedges and boundaries in low sandy places in the eastern section.

Mahonia japonica. From 2 to 4 feet high, the large, compound leaves with spiny teeth and the yellow flowers appearing in late winter or early spring. Thrives best in a partly shaded position.

Camellia japonica. One of the most beautiful evergreen shrubs with dense, deep green shining leaves, large waxy flowers in a great variety of colors. It blooms in early spring or late winter and is for that reason of great value and interest. It is almost or quite hardy along the coastal strip if put in a somewhat protected position.

Tea Plant (*Camellia Thea*). A deep green, globose shrub with elongated leaves and white flowers that bloom in winter. It is hardy along the coast and as far inland as Fayetteville and should be planted for its great interest as the producer of a popular drink.

GARDENIA OR CAPE JESSAMINE (*Gardenia florida*). One of the best known evergreen exotics of the south and associated like the camellia and sweet olive with old Southern gardens. The leaves are shiny and the flowers waxy white. It is hardy through most of the coastal plain, and if put in a protected position may be kept living indefinitely at Chapel Hill, though often cut back by severe frosts.

LAURESTINUS (*Viburnum tinus*). An upright shrub of dense compact form and with abundant umbels of whitish flowers in winter. The flower buds are red and have color a long time before they blossom. Hardy at least as far inland as Raleigh. The nurseries recommend three other evergreen varieties which we have not seen in cultivation. They are *Viburnum odoratissimum*, *V. suspensum* (*V. sandakma*) and *V. rhytidophyllum*.

ROSEMARY (*Rosmarinus officinalis*). An herbaceous evergreen shrub with aromatic, dark green, linear leaves and light blue flowers. Very good for foundation planting.

LAVENDER (*Lavendula vera*). An evergreen herbaceous shrub with fragrant whitish leaves and blue flowers. Very pretty for foundation planting, especially if alternated with the contrasting dark green of rosemary.

DWARF PALMETTO (*Sabal glabra*). This little palmetto with creeping stems extends along our coast and can be used to fine effect in the coastal strip. For the tree palmetto see under trees, p. 32.

YUCCAS. We have at least four native species, all of which are good. *Yucca aloifolia* is the tallest and is well placed at the corners of buildings behind smaller species; *Yucca gloriosa* is good for clumps in angles of paths. In *Yucca filamentosa* and its variety *concava* the leaves rise only a foot or so above the ground but the tall scape of white flowers is very conspicuous and attractive in masses.

Canes or *Bamboos*. A number of oriental bamboos make very hardy and excellent screens and windbreaks, although there is some objection to them as they spread by underground runners. Among the most valuable are Palmate-leaved Bamboo (*Bambusa palmata*), Tall Chinese Bamboo (*Arundinaria Simoni*), Japanese Cane (*Arundinaria japonica*). Of these the Japanese Cane is the highest and the Palmate-leaved Bamboo the lowest.

Deciduous Shrubs

(See also Hedge Plants)

FIVE-LEAVED ANGELICA (*Acanthopanax pentaphyllum*). Large, 5 to 10 ft., useful for its foliage which is bright green and shining. Graceful and compact in outline and very permanent. If the tips of the arching branches touch the ground they easily take root and form new plants.

ROSE OF SHARON (*Althea frutex, Hibiscus syriacus*). A tall open shrub that is very valuable, as the flowers appear late in summer and early fall when few other shrubs are in blossom. It should be used behind lower and more compact shrubs. Among the best varieties are: *ardens, bicolor, carneo-plenus, Jean d'Arc.*

Groundsel Tree (*Baccharis halimifolia*). An abundant shrub in damp places near the coast. The dark green and lustrous leaves and the fluffy white fruiting heads make it very good for damp places. Hardy throughout the state in cultivation and nearly evergreen on the coast.

Spicewood (*Benzoin aestivale*). Native to the state. A good shrub for damp places. The small greenish flowers, while not conspicuous, appear early in spring before the leaves and are pretty and fragrant. The leaves and branches also have a spicy fragrance.

European Barberry (*Berberis vulgaris*). A sturdy shrub with yellow flowers in hanging clusters, scarlet berries and light green leaves. Does well in the middle and western sections. The variety *purpurea* is a good purple-leaved variety of this.

Summer Lilac (*Buddleia Daviddi Veitchiana*). An open shrub with long, simple, arching shoots which bear large heads of fragrant pale violet flowers from June to frost. As few shrubs flower during the summer and fall this handsome one is of distinct value.

Slender Deutzia (*Deutzia gracilis*). A small shrub about 2 ft. high with graceful, arching branches and nodding racemes of pure white flowers in early spring. Very pretty and valuable for foundation planting.

Deutzia (*Deutzia scabra*). A strong and permanent shrub with whitish flowers in abundance. Blooms just after spireas and can be planted with them to good effect. A double variety of this with pink flowers is *plena rosea* and a double white is *plena alba.*

Hybrid Golden Bell (*Forsythia intermedia*). A tall shrub, with slender, arching branches, flowers golden yellow, produced in great profusion, blooms in March. This and the other forsythias are among the most dependable and satisfactory early spring bloomers and should be extensively used. Other species are *Fortunei* with more upright growth and *suspensa* with slender, drooping branches.

Silverthorn (*Elæagnus longipes*). A very permanent and hardy shrub of good rounded form with dense leaves silvery beneath, and with red berries that make a good jelly.

Winged Burning Bush (*Euonymus alatus*). A dense spreading shrub with corky-winged branches. Flowers yellowish, fruit purplish; leaves turning to gorgeous shades of red and crimson in the fall.

Pearl Bush (*Exochorda grandiflora*). A tall hardy shrub with dazzling white blossoms. As it is apt to become bare below, it is best to mass it with or place it behind other shrubs.

Panicled Hydrangea (*Hydrangea paniculata*). A very hardy tall shrub with white flowers borne in panicles; very good for massing. It will not succeed in dry or poor places and in the coastal plain should be planted only where rich, damp ground is available. A garden form of this, var. *grandiflora,* has extremely large and showy flowers and is very popular. In the mountains both will succeed in any rich soil.

SWEET SHRUB, SWEET BETSIE (*Calycanthus floridus*). An upright shrub with dark foliage and very fragrant, dark brown flowers, which are loved by children. Native in the mountain and middle sections. It is easily increased by shoots from the base.

DESERT WILLOW (*Chilopsis linearis*). A tall open growing shrub with linear leaves and yellow-striped lilac flowers. Blooms continually from April until frost. The plant has an exotic look and is good for contrast and interest.

FRINGE TREE (*Chionanthus virginiana*). A shrub or low tree with dark green leaves and feathery, graceful, very fragrant flowers in long clusters. Native to the state and a member of the olive family as one might easily guess from the small olive-like blue fruits. One of the best tall ornamentals for the back of borders.

AZALEAS. Our state is rich in species of azaleas and some are found in all sections. If given proper conditions they will be a brilliant addition to any place (see p. 14 for directions). In the mountains the great flame azalea (*Azalea calendulacea*) and the tall white azalea (*A. arborea*) are the best to use. In other parts of the state the last mentioned, together with *A. viscosa* and *A. nudiflora*, are successful. In the damp, sandy flats of the coastal region *A. atlantica* will do well. Among exotic species *A. amoena* and *A. Hinodegiri*, which are evergreen, are most adaptable and thrifty.

SWEET PEPPERBUSH (*Clethra acuminata*). A small shrub of marshy soil with alder-like leaves and showy white flowers of an intense, spicy fragrance; especially useful in wet places.

RED-OSIER DOGWOOD (*Cornus stolonifera*). A shrub with dark red branches and creamy white flowers. The red shoots are extremely showy in winter, but from our experience it is not very permanent in this state.

WINTER FLOWERING JESSAMINE (*Jasminum nudiflorum*). A small shrub with slender, arched, green branches and yellow flowers which bloom in winter and early spring. This is about the best plant for the front of a shrub border as it forms a dense pillow from the very ground and fits in perfectly to meet higher shrubs.

GLOBE FLOWER, GUELDER ROSE (*Kerria japonica*). A shrub 4 to 6 ft. tall, with numerous, bright yellow, large and showy flowers and green stems. One of the most beautiful shrubs and extremely valuable when not attacked by a fungus, which in Chapel Hill has killed out almost every single specimen in recent years. The *guelder rose* is a variety of this with double flowers.

SHRUBBY BUSH CLOVER (*Lespedeza bicolor*). A shrubby herb 3 to 5 ft. tall, with dark green leaves and showy purple flowers. The branches die to the ground every year, but quickly come again in spring and curve over in a graceful way to meet the ground.

SWEET BREATH OF SPRING (*Lonicera fragrantissima*). One of the most charming of the early flowering shrubs, with a delightful fragrance notice-

PLATE 11

a *b*

WINTER SCENE IN YARD OF W. C. COKER

Taken by Dr. J. K. Small and first published in Bull. N. Y. Bot. Garden, Vol. 31, Plate 251, 1920

a—Jersey Scrub Pine. *b*—Cedar. The encircling shrubs are Winter Jessamine in front of red and white Japanese Quince.

able at a long distance. Graceful throughout the year and semi-evergreen with us. Its permanence, hardiness and large size are great advantages and it should be used abundantly.

Lilacs (*Syringa vulgaris* and *Syringa persica*). These old favorites are extremely useful in the middle and western sections, but in the coastal plain they do not bloom freely and lose their value. In addition to the old types there are very many greatly improved varieties and it is very desirable that someone should make a hobby of them and test out their flowering qualities here. Among the best are *Marie Legraye*, white; *Persica alba*, white; *Louise Henri*, lilac; *Ludwig Spaeth*, red; *Prof. Stockhardt*, lavender.

Snowberry, Waxberry (*Symphoricarpus racemosus*). A graceful, low shrub with slender curved branches, rose-colored flowers and persistent white berries. Excellent for covering ground under trees or for massing where something low is desired. Its habit of suckering enables it to cover the ground rapidly.

Coralberry (*Symphoricarpus vulgaris*). Very similar to the above, with coral colored berries.

Fragrant Sumach (*Rhus canadensis*). A spreading shrub 3 to 8 feet high with aromatic leaves; flowers yellow, the small fruit coral red. Will flourish in any soil, especially dry rocky banks.

Smoke Bush (*Rhus cotinus*). A very permanent bush 10 to 12 feet high with feathery, purple heads, giving the plant a smoky appearance. Blooms in early summer.

White Kerria (*Rhodotypos kerrioides*). An ornamental shrub with large white flowers followed by black and shining nutlets which persist during the winter. Thrives in any good soil.

Buckthorn (*Rhamnus carolinianus*). A small tree; leaves dark green and shiny; berries first red then black. Very hardy and excellent for foliage effect and as a background for shrubs.

Pomegranate (*Punica grantaum*). A tall, summer flowering shrub with orange, pink, white, red, or striped flowers and edible fruit. Fills a much needed place with its late flowers.

Syringa, Mock Orange (*Philadelphus coronarius*). A hardy shrub with upright, often arching branches; flowers creamy white and extremely fragrant and very numerous. Handsome and desirable behind smaller shrubs.

Syringa, Mock Orange (*Philadelphus grandiflorus*). A native unscented species of the same usefulness as the preceding.

Narrow-leaved Crab Apple (*Malus angustifolia*). A low bushy tree with stiff, thorny branches, leaves narrow and half evergreen. Flowers rosy red and very fragrant; fruit yellowish green. Native to the state and exceedingly decorative unless impaired by the cedar apple rust or San José scale.

Starry Magnolia (*Magnolia stellata*). A large shrub or tree with spreading branches. Flowers numerous, white, scented, appearing before the dark green abundant leaves.

Vines

FIVE-LEAVED AKEBIA (*Akebia quinata*). A very ornamental climber with twining stems; leaves almost evergreen; flowers rosy purple, produced in late spring. It prefers moist loamy soil and sunny exposure and is especially useful to train over doors and windows as the growth is limited and does not require much trimming and control.

CHINESE WISTERIA (*Wisteria chinensis*). A very strong climber with flowers borne in long dense purple clusters which appear in spring before the leaves. One of the most beautiful vines for pergolas, buildings and old trees. A white variety is especially good.

Jasminum primulum. A delicate vine of moderate size. Its exquisite fragrance when in flower should win it a place somewhere in every garden.

STAR JESSAMINE (*Trachelospermum jasminoides*). A beautiful evergreen climber with dark green foliage and deliciously fragrant white flowers in May and April and again in November and December. It should be put into rich, moist soil and does best in the eastern section.

ENGLISH IVY (*Hedera helix*). A well known and excellent evergreen for decorating buildings, trees and walls. Easily obtained from cuttings. It dislikes hot sun and in the eastern section should be given a shaded location.

YELLOW JESSAMINE (*Gelsemium sempervirens*). A twining vine with persistent deep green leaves and bright yellow fragrant flowers in early spring. Does well in cultivation where the soil is not too dry and should be used much more.

CLIMBING EUONYMUS (*Euonymus radicans*). An evergreen vine climbing with rootlets to the height of 15 or 20 feet. Good for covering walls, rocks or trunks of trees. Leaves small, fruit pink or scarlet. If clipped it also makes a fine border or low hedge.

BOSTON OR JAPANESE IVY (*Ampelopsis tricuspidata*). A hardy and very useful vine, climbing high by means of disc-bearing tendrils. Resists the dust and smoke of cities and turns to a vivid orange and scarlet in the fall. Excellent for covering brick or stone buildings.

VIRGINIA CREEPER (*Ampelopsis quinquefolia*). One of the most refined and useful of our native vines. The adhesive tendrils enable it to climb either solid masonry, trees or trellises and it is especially fine for covering fences. The gorgeous fall coloring is unsurpassed.

PEPPER-VINE (*Ampelopsis arborea*). This is native to our seashore and its much compounded leaves are even more delicate than those of the Virginia Creeper. It is very vigorous and does well as far west as Chapel Hill.

GRAPES. Any vigorous species of grape makes a good arbor vine. The wild sorts as *summer grape, fox grape,* and *possum grape* are delightfully fragrant in flower and have very healthy foliage. The *scuppernong* and *wild bullace grape* are almost too rampant for use except on large arbors.

Cross Vine (*Bignonia capreolata*). A hardy native vine. Flowers reddish orange, yellow within, very showy. The tendrils climb by sucking discs and enable the plant to climb tree trunks, walls, or buildings.

Trumpet Vine (*Tecoma radicans*). This is one of the best vines to run up posts of fences and to cover outhouses. The very conspicuous red and orange flowers bloom for a long time in late spring and summer.

Japanese Clematis (*Clematis paniculata*). A very fine vine for porches, arbors and fences. The white flowers in foamy masses practically cover the plant in late summer.

Virgin's Bower (*Clematis virginiana*). This native species has much the same habit as the above and is equally useful.

Honeysuckles. Several of these are good. Our wild *trumpet honeysuckle* with beautiful, red-orange flowers is one of the best. The *Japanese honeysuckle* is an evergreen and very useful if care is taken to plant it only where it will not have a chance to invade hedges and shrubberies.

Climbing Roses. There is a long list of good roses suitable for training on arbors, porches and fences. The fine old evergreen, *Cherokee*, and the delightful *Lady Bankshire* are two of the very best for the sandier and warmer parts of the state. Of the newer single sorts the *American Pillar* and the *Silver Moon* have no superior in beauty and are almost quite free from the destructive mildew that ruins the usefulness of so many kinds. In Chapel Hill the *Dorothy Perkins, Lady Gay, Crimson Rambler* and *Memorial roses* are all badly hurt by this pest. Of the hybrid double-flowered sorts some of the best are *Climbing Clothilde Supert, Climbing Meteor, Reine Marie Henriette, Souvenir de la Malmaison* and *Devoniensis.*

Annual Vines. Many of these are useful for quick results and are well known. *Morning Glory, Moon Flower, Cypress Vine, Balsam Vine, Madeira Vine, Cinnamon Vine* and *Hop Vine* are among the best.

Perennial Flowers and Ferns

Plume Poppy (*Bocconia cordata*). A tall, striking plant with glaucous leaves and feathery white flowers; effective at the back of wide borders. Spreads rapidly by suckers, which if detached will make a strong plant in a single season.

Bugbane (*Cimicifuga racemosa*). A wild flower that is tall and suitable for the back of borders. Leaves large; flowers in white racemes, which appear in summer.

Lily of the Valley (*Convallaria majalis*). Fine for a ground cover in rich, shady places and may be planted at edge of shrub borders with good effect.

Lance-leaved Tickseed (*Coreopsis lanceolata*). A showy free flowering species with large golden flowers; excellent for cutting. It is very hardy and succeeds in any soil.

Sweet William (*Dianthus barbatus*). A very pretty plant about 8 inches high; good for border planting.

CALIFORNIA BLEEDING HEART (*Dicentra formosa*). A dainty plant about fifteen inches high with finely divided graceful leaves and pale rose-colored, heart-shaped flowers. Blossoms at intervals from spring till autumn.

GAS PLANT (*Dictamnus fraxinella* and var. *alba*). A very hardy and persistent perennial forming clumps two feet high with lemon-scented rose, pink or white flowers and glossy green leaves.

LEMON LILY (*Hemerocallis flava*). A very hardy and popular garden flower with narrow grass-like leaves and lemon yellow flowers; remarkably free from enemies. It prefers moist soil and partial shade.

TAWNY DAY LILY (*Hemerocallis fulva*). Flowers orange and not fragrant; a larger and stronger grower than the above.

HIBISCUS MALLOW MARVELS. Desirable border plants, succeeding in sunny places, but preferring dampness; 3 to 5 feet high and with large foliage and enormous flowers in the richest shades of crimson, pink and white.

GOLD FLOWER (*Hypericum Moserianum*). A small shrub from 1 to 2 feet high, adapted to herbaceous borders; flowers golden yellow, 2 inches across, very showy.

HARDY CANDYTUFT (*Iberis sempervirens*). A plant 8 to 10 inches high with evergreen foliage and dense heads of white flowers in early spring; fine for borders.

IRIS. In addition to the old-fashioned purple and white sorts of the common garden or *German iris*, there are now many other varieties of this and other species. Among the best of these are the varieties *pallida dalmatica*, with large and fragrant light lavender flowers, and *spectabilis*, a deep rich purple. Excellent for massing.

REDHOT POKER, TORCH LILY (*Tritoma grandis*). A striking plant with sword-like leaves, 2 to 3 feet long and a scape of vivid red and yellow flowers.

BLAZING STAR, BUTTON SNAKEROOT (*Liatris picnostachya*). A wild flower which is very hardy in cultivation, producing purplish flowers in late summer and autumn, 5 feet high. Very showy and beautiful when grouped in masses.

VIRGINIA COWSLIP, BLUEBELLS (*Mertensia virginica*). A native early flowering plant from 1 to 2 feet high, with large glaucous green leaves and showy blue flowers fading to clear pink.

LUPINES. Low plants with showy spikes of conspicuous blue flowers; easy to cultivate and excellent for sandy dry soil. Our two native species of the sand-hills and coast are fine for those regions.

PEONY. A very hardy, showy and beautiful plant with many varieties; flowers very large, single or double. They grow from 1 to 2 feet high and are very effective when planted in front of shrubbery. They do best in the mountains and are not fitted for the coastal plain. Among the best varieties are *edulis superba, Duchesse de Nemours, Felix Crousse, festiva maxima, Madame Calot, Messonier.*

GROUND OR MOSS PINK (*Phlox subulata*). A low native plant with pink or white flowers; good for rocky and dry places.

Garden Phloxes of many sorts and colors are among the most brilliant of moderately tall perennials; *Miss Lingard* is the best white, and *W. C. Egan* the best pink.

Golden Glow (*Rudbeckia laciniata*). A hardy, showy plant 2 to 7 feet high with bright yellow flowers blooming in late summer or fall.

Showy Sedum (*Sedum spectabile*). The most popular of the sedums, 1 to 2 feet high. The flat-topped flower heads vary from rose to purple and appear in late summer and fall. Very effective in borders and in dry, rocky soil.

Mountain Feather Fleece (*Stenanthemum robustum*). A rare and native perennial with showy panicles of white fleecy flowers in late summer and early fall. Does best in a moist, somewhat shady position in the western section.

Feathered Columbine (*Thalictrum aquilegifolium*). 1 to 3 feet high with large leaves and white feathery flowers. Very hardy and well suited to borders that are not too dry.

Common Periwinkle (*Vinca minor*). A hardy evergreen trailing herb with blue flowers. The best ground cover in shade for the south.

Large Periwinkle (*Vinca major*). A shade-loving evergreen vine with pretty blue flowers. One of the very best ground covers for the south.

Pampas Grass (*Gynerium argenteum*). This fine grass is worthy a place in any yard and is particularly suited to fill the center of a flower-bed or a small angular area between paths. The tall, white flower spikes and fountain-like foliage make it a striking object.

Bulbs. Many beautiful kinds are available and the hardier sorts will give fine results with less attention than almost anything else. As most bulbs multiply rapidly they can nearly always be got without cost from friends in the neighborhood. A few are mentioned on page 21.

Ferns. In shady rich places by buildings or fences or borders almost any of the strong growing ferns of the neighborhood will do well if given water in the dryest times. Many people will enjoy these and the children will be interested in bringing them in. As with other plants they will be much helped by a top dressing of manure once a year. Among the largest and best suited to cultivation are *Cinnamon Fern, Royal Fern, Goldie's Fern, Maiden-hair Fern* and *Christmas Fern.*

Annual Flowers

We do not think it worth while further to lengthen this Bulletin by a discussion of annual flowers. Most people are familiar with a good many of these that are most useful and popular. They can be used to good effect in school gardens and in vacant places around the building between shrubs. See page 21 for the names of a few early kinds.

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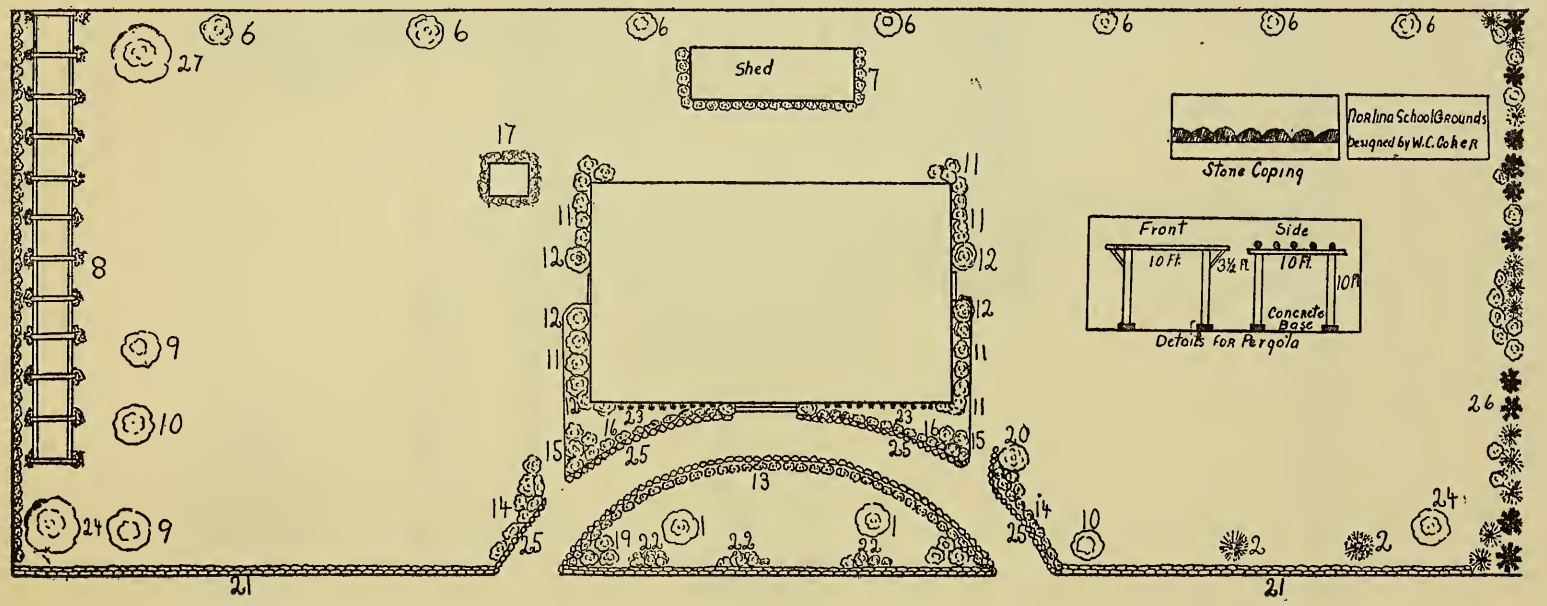
Plates and Illustrative Designs of School Grounds

KEY OF PLAN FOR NORLINA SCHOOL

(Plate 12)

1. Magnolia, *Magnolia grandiflora.*
2. Red Cedar, *Juniperus virginiana.*
3. Loblolly Pine, *Pinus taeda.*
4. Flowering Dogwood, *Cornus florida.*
5. Black Willow, *Salix nigra.*
6. Sugar Maple, *Acer saccharum.*
7. Quihoui Privet, *Ligustrum Quihoui.*
8. Wisteria, *Wisteria chinensis.*
9. Elm, *Ulmus americanus.*
10. Oak, *Quercus* (found in place).
11. Japanese Quince, *Pyrus japonica.*
12. Sweet Breath of Spring, *Lonicera fragrantissima.*
13. Thunberg's Spirea, *Spirea Thunbergii.*
14. Hydrangea, *Hydrangea.*
15. Forsythia, *Forsythia Fortunei.*
16. Winter Jessamine, *Jasminum nudiflorum.*
17. Virginia Creeper, *Ampelopsis quinquefolia.*
18. Bear Grass, *Yucca filamentosa.*
19. Abelia, *Abelia grandiflora.*
20. Crape Myrtle, *Lagerstroemia indica.*
21. Stone wall (two feet high).
22. English Ivy, *Hedera helix.*
23. Bear Grass, *Yucca filamentosa.*
24. Beech, *Fagus grandifolia.*
25. Stone coping.
26. Hedge of 2, 3, 4 and 5.
27. Pin Oak, *Quercus palustris.*

PLATE 12

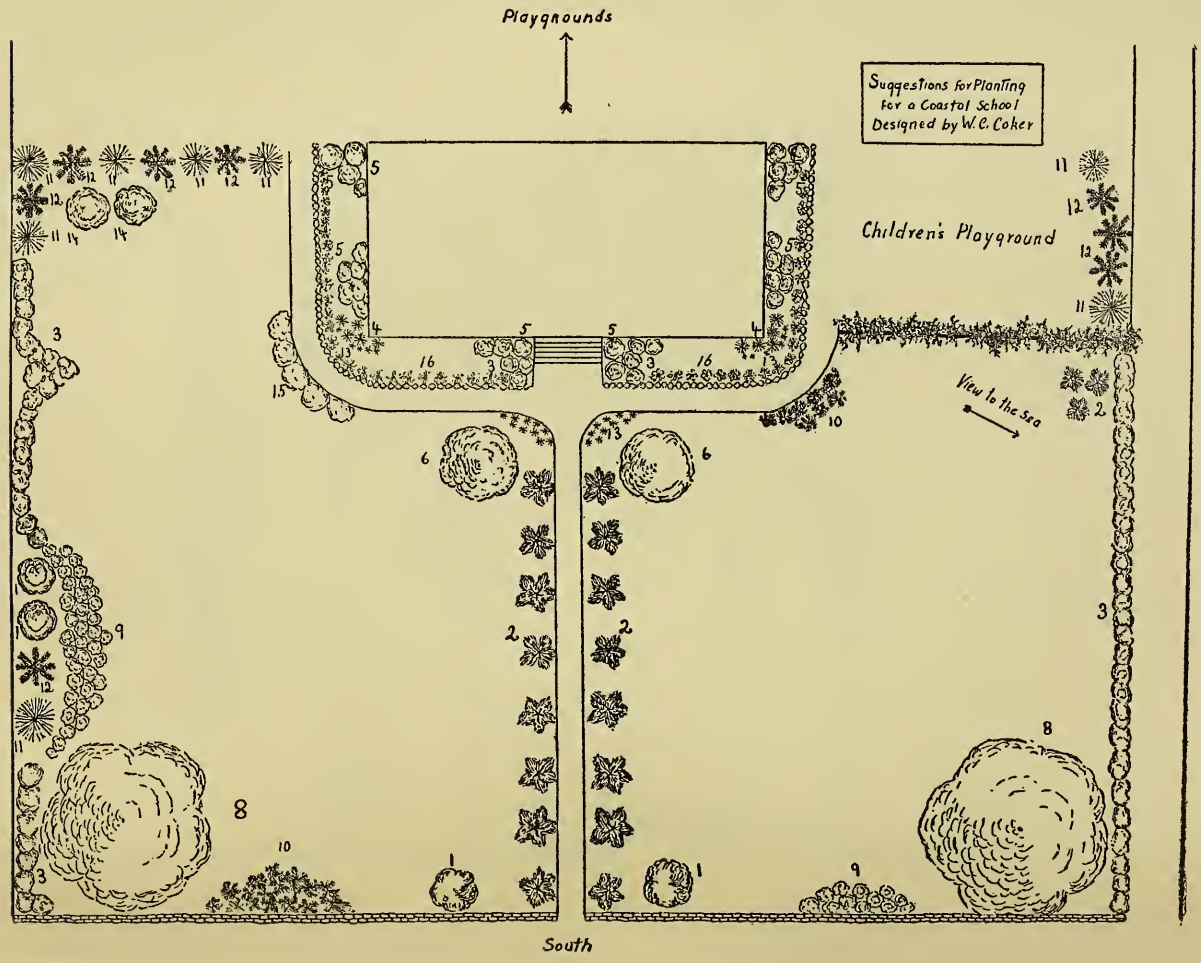

Shed
Norlina School Grounds
Designed by W.C. Cohen
Stone Coping
Front
Side
10 Ft.
3½ Ft.
10 Ft.
10 Ft.
Concrete Base
Details for Pergola

KEY OF PLAN FOR A SCHOOL NEAR THE COAST

(Plate 13)

1. American Olive, *Osmanthus americanus.*
2. Palmetto, *Sabal Palmetto.*
3. Yopon, *Ilex vomitoria.*
4. Spanish Bayonet, *Yucca gloriosa.*
5. Wax Myrtle, *Myrica cerifera.*
6. Magnolia, *Magnolia grandiflora.*
7. Cherokee Rose Hedge on Fence, *Rosa laevigata.*
8. Live Oak, *Quercus virginiana.*
9. Oleander, *Nerium oleander.*
10. *Tamarix gallica.*
11. Cedar, *Juniperus virginiana.*
12. Pine, *Pinus Taeda.*
13. Yucca, *Yucca aloifolia.*
14. Dogwood, *Cornus florida.*
15. Tea, *Camellia thea.*
16. Lupine, *Lupinus perennis.*

PLATE 13

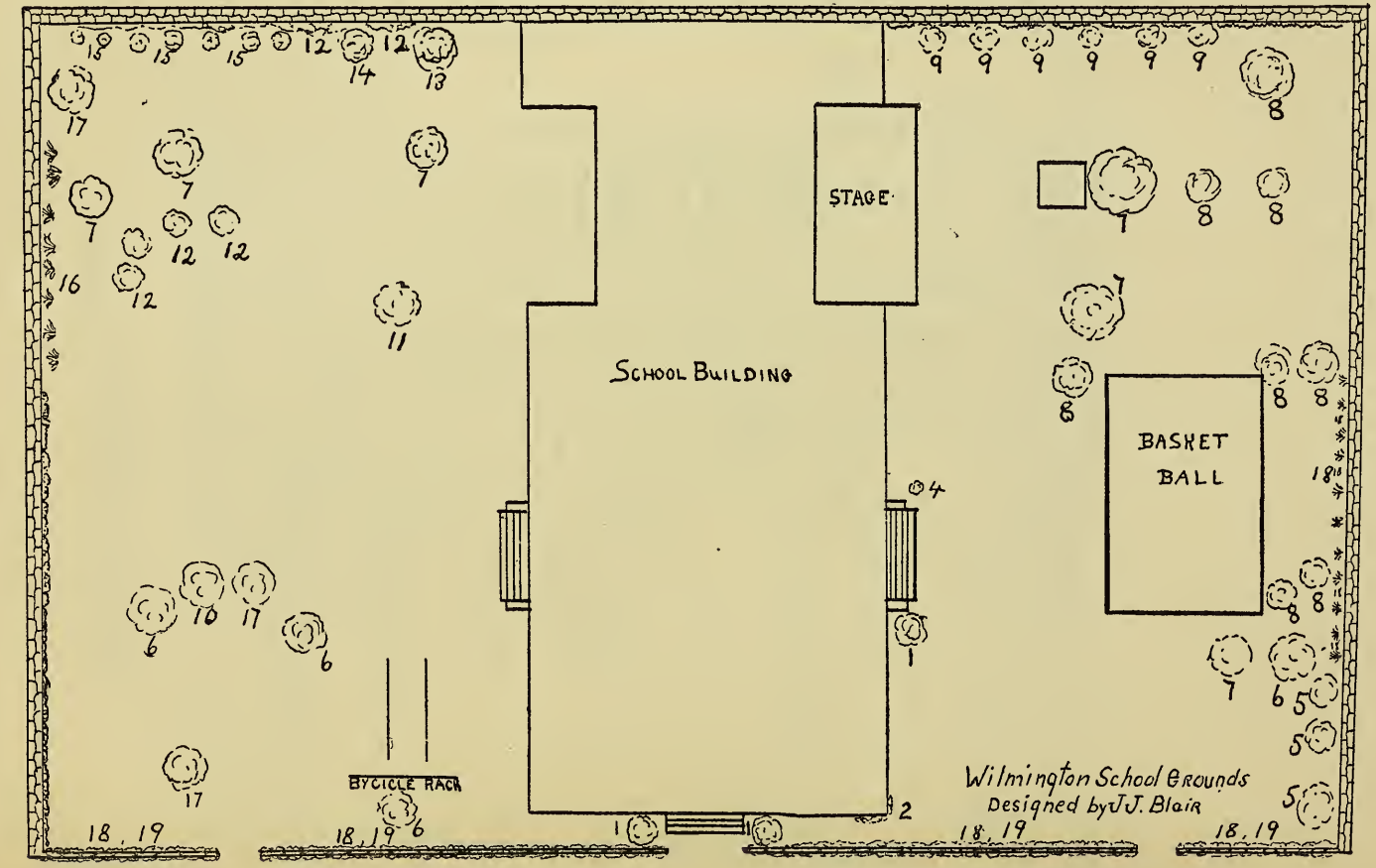

Playgrounds
Suggestions for Planting for a Coastal School Designed by W. C. Coker
Children's Playground
View to the sea
South

KEY OF PLAN FOR WILMINGTON SCHOOL

(Plate 14)

1. Privet, *Ligustrum.*
2. English Ivy, *Hedera helix.*
3. Lilac, *Syringa vulgaris.*
4. American Elm, *Ulmus americana.*
5. Magnolia, *Magnolia grandiflora.*
6. Live Oak, *Quercus virginiana.*
7. Crape Myrtle, *Lagerstroemia indica.*
8. Peach, *Prunus persica.*
9. Mimosa, *Albizzia julibrissin.*
10. Dogwood, *Cornus florida.*
11. Wisteria, *Wisteria chinensis.*
12. Sycamore, *Platanus occidentalis.*
13. Althea, *Hibiscus syriacus.*
14. Sweet Shrub, *Calycanthus floridus.*
15. Cannas.
16. Chinaberry, *Melia Azedarach.*
17. Cypress Vine, *Ipomea Quamoclit.*
18. Climbing Rose.

PLATE 14

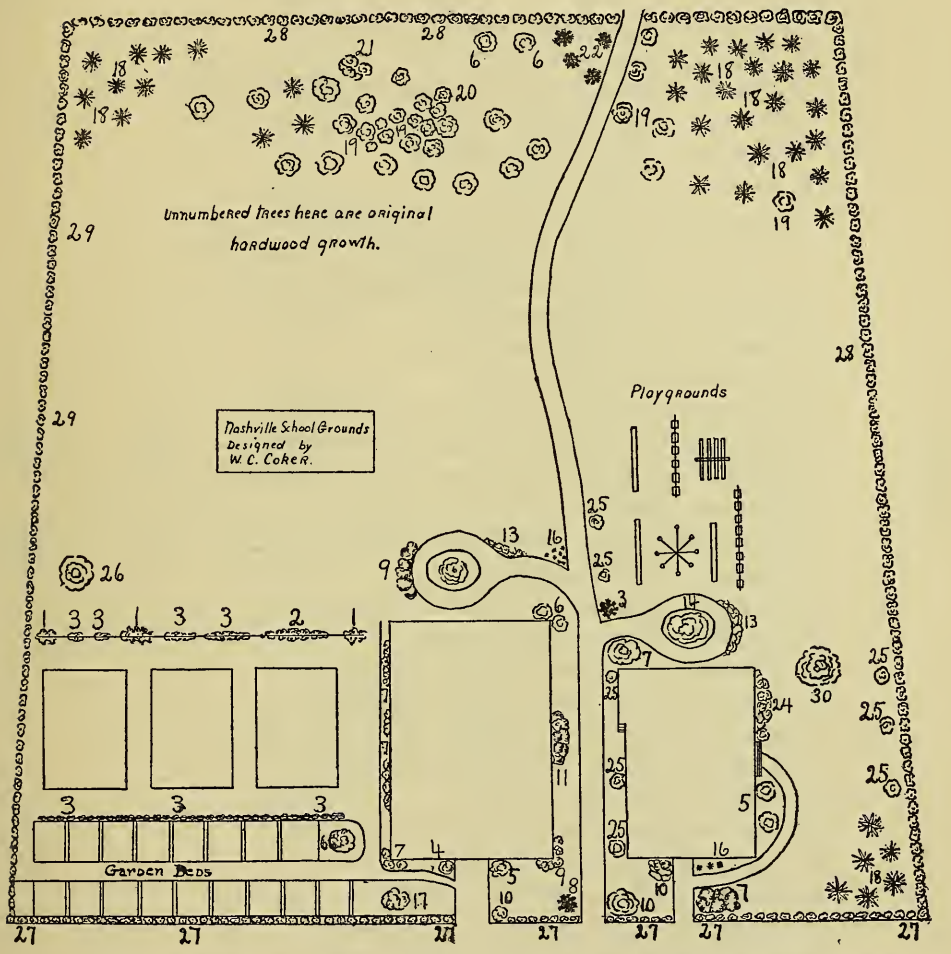

STAGE
SCHOOL BUILDING
BASKET BALL
BYCICLE RACK
Wilmington School Grounds
Designed by J.J. Blair

KEY OF PLAN FOR NASHVILLE SCHOOL

(Plate 15)

1. Trumpet Vine, *Tecoma radicans.*
2. Virgin's Bower, *Clematis virginiana.*
3. Yellow Jessamine, *Gelsemium sempervirens.*
4. Sweet Breath of Spring, *Lonicera fragrantissima.*
4. Syringa, *Philadelphus coronarius.*
6. Mock Orange, *Laurocerasus caroliniana.*
7. Bridal Wreath, *Spirea prunifolia.*
8. Red Cedar, *Juniperus virginiana.*
9. Forsythia, *Forsythia Fortunei.*
10. Van Houtte's Spirea, *Spirea Van Houttei.*
11. Ibota Privet, *Ligustrum Ibota.*
13. Winter Jessamine, *Jasminum nudiflorum.*
14. Mimosa, *Albizzia julibrissin.*
15. Magnolia, *Magnolia grandiflora.*
16. Spanish Bayonet, *Yucca gloriosa.*
17. Photinia, *Photinia serrulata.*
18. Pine, *Pinus taeda.*
19. Dogwood, *Cornus florida.*
20. Redbud, *Cercis canadensis.*
21. Sweet Bay, *Magnolia glauca.*
22. Cypress, *Taxodium distichum.*
23. Cherry (found in place).
24. Abelia, *Abelia grandiflora.*
25. Maple, *Acer saccharum.*
26. Apple Tree, *Pyrus Malus.*
27. Barberry Hedge, *Berberis Thunbergii.*
28. Trifoliate Orange, *Citrus trifoliata* (hedge).
29. Ibota Privet, *Ligustrum Ibota* (hedge).
30. Beech, *Fagus grandifolia.*

PLATE 15

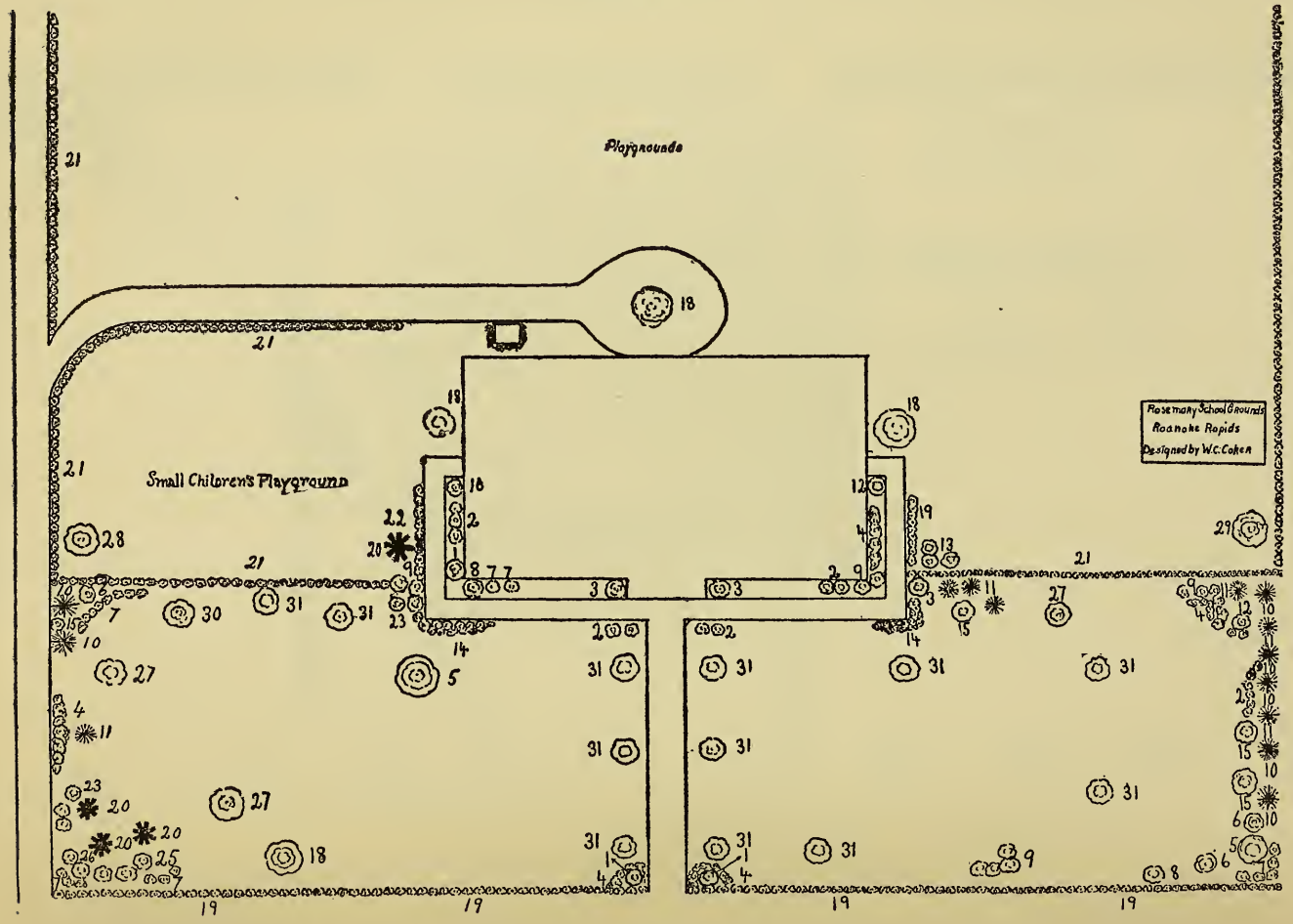

Unnumbered trees here are original hardwood growth.
Nashville School Grounds
Designed by
W. C. Coker.
Playgrounds
Garden Beds

KEY OF PLAN FOR ROSEMARY SCHOOL, ROANOKE RAPIDS

(Plate 16)

1. Crape Myrtle, *Lagerstroemia indica.*
2. Abelia, *Abelia grandiflora.*
3. Sweet Breath of Spring, *Lonicera fragrantissima.*
4. Golden Bell, *Forsythia suspensa.*
5. Magnolia, *Magnolia grandiflora.*
6. Dogwood, *Cornus florida.*
7. Van Houtte's Spirea, *Spirea Van Houttei.*
8. Japanese Quince, *Pyrus japonica.*
9. Syringa, *Philadelphus coronarius.*
10. Loblolly Pine, *Pinus taeda.*
11. Red Cedar, *Juniperus virginiana.*
12. Redbud, *Cercis canadensis.*
13. Lombardy Poplar, *Populus nigra italica.*
14. Winter Jessamine, *Jasminum nudiflorum.*
15. Soulange's Magnolia, *Magnolia Soulangeana.*
16. Quihoui Privet, *Ligustrum Quihoui.*
17. Japanese Privet, *Ligustrum Japonicum.*
18. Mimosa, *Albizzia julibrissin.*
19. Japanese Barberry, *Berberis Thunbergii.*
20. Norway Spruce, *Picea excelsa.*
21. Trifoliate Orange, *Citrus trifoliatus.*
22. Japanese Rose, *Rosa rugosa.*
23. Deutzia, *Deutzia crenata.*
24. Deodara Cedar, *Cedrus Deodara.*
25. Smoke Bush, *Rhus cotinus.*
26. Chaste Tree, *Vitex Agnus-Castus.*
27. Pin Oak, *Quercus palustris.*
28. Honey Locust, *Gleditsia triacanthos.*
29. Sweet Gum, *Liquidambar styraciflua.*
30. Weeping Willow, *Salix vitellina aurea.*
31. Sugar Maple, *Acer saccharum.*

PLATE 16

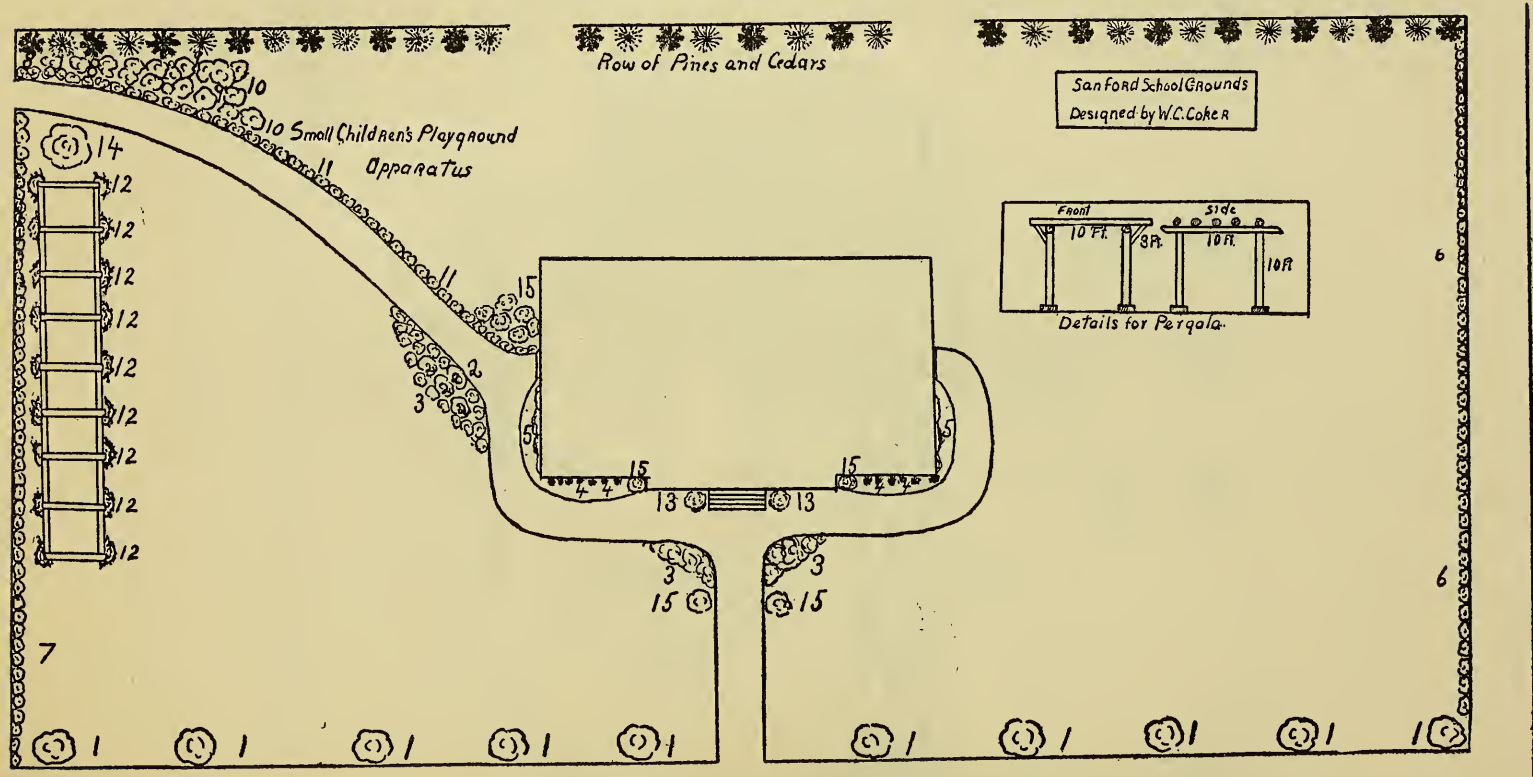

Playgrounds
Small Children's Playground
Rosemary School Grounds
Roanoke Rapids
Designed by W.C. Coker

KEY OF PLAN FOR EAST SANFORD SCHOOL

(Plate 17)

1. Willow Oak, *Quercus Phellos.*
2. Van Houtte's Spirea, *Spirea Van Houttei.*
3. Winterflowering Jessamine, *Jasminum nudiflorum.*
4. Spanish Bayonet, *Yucca gloriosa.*
5. Boston Ivy, *Ampelopsis Veitchei.*
6. Japanese Quince, *Pyrus japonica.*
7. Trifoliate Orange, *Citrus trifoliata.*
8. Bridal Wreath, *Spirea prunifolia.*
9. Syringa, *Philadelphus coronarius.*
10. Golden Bell, *Forsythia suspensa.*
11. Gallberry, *Ilex glabra* (hedge).
12. Wisteria, *Wisteria chinensis.*
13. Sweet Breath of Spring, *Lonicera fragrantissima.*
14. Magnolia, *Magnolia grandiflora.*
15. Crape Myrtle, *Lagerstroemia indica.*

PLATE 17

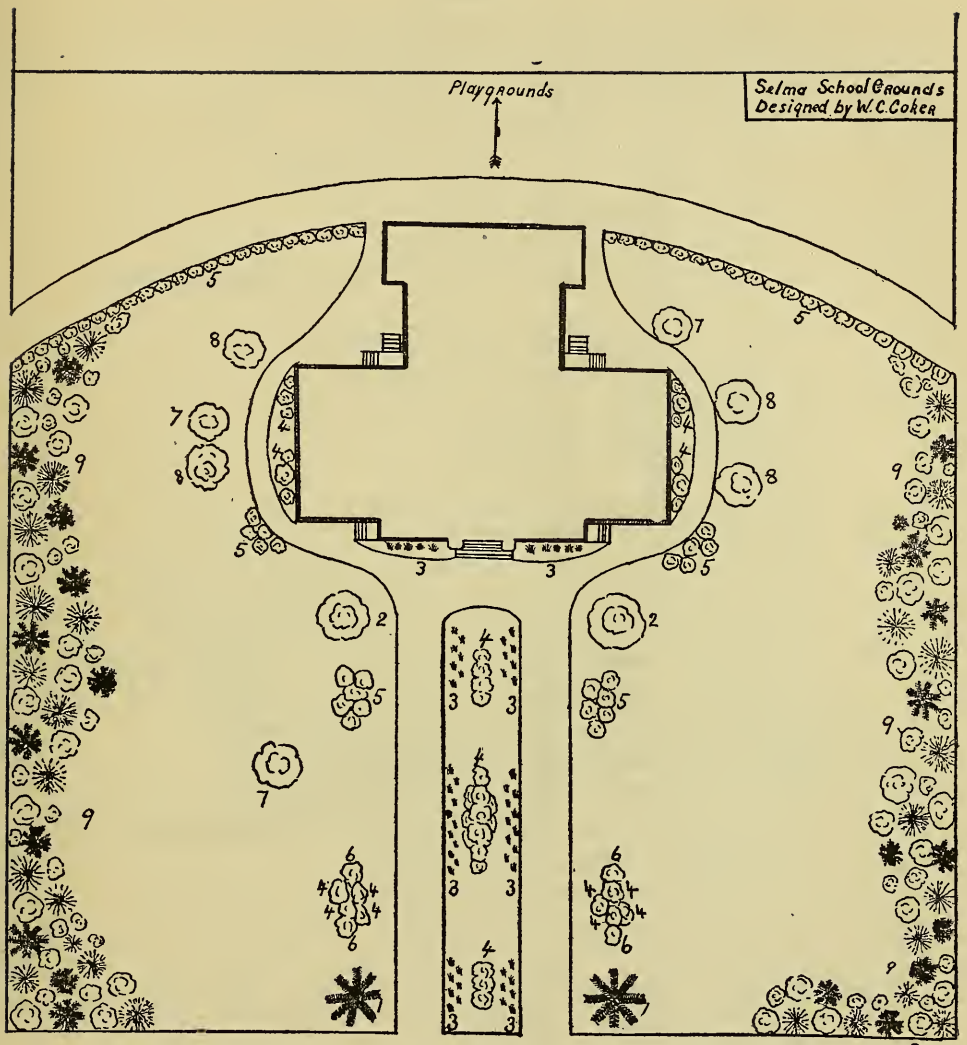

Row of Pines and Cedars
San Ford School Grounds
Designed by W.C. Coker
10 Small Children's Playground
Apparatus
Front
Side
10 Ft.
8 Ft.
10 Ft.
10 Ft.
Details for Pergola.

KEY OF PLAN FOR SELMA SCHOOL

(PLATE 18)

1. CYPRESS, *Taxodium distichum.*
2. SWEET BAY, *Magnolia glauca.*
3. BEAR GRASS, *Yucca filamentosa.*
4. GALLBERRY, *Ilex glabra.*
5. BAYBERRY, *Myrica cerifera.*
6. SWEET PEPPERBUSH, *Clethra alnifolia.*
7. BEECH, *Fagus grandifolia.*
8. LIVE OAK, *Quercus virginiana.*
9. Border of PINE (*Pinus taeda*), CEDAR (*Juniperus virginiana*), SWEET BAY (*Magnolia glauca*), HOLLY (*Ilex opaca*), BLACK WILLOW (*Salix nigra*) and SWEET PEPPERBUSH (*Clethra alnifolia*).

PLATE 18

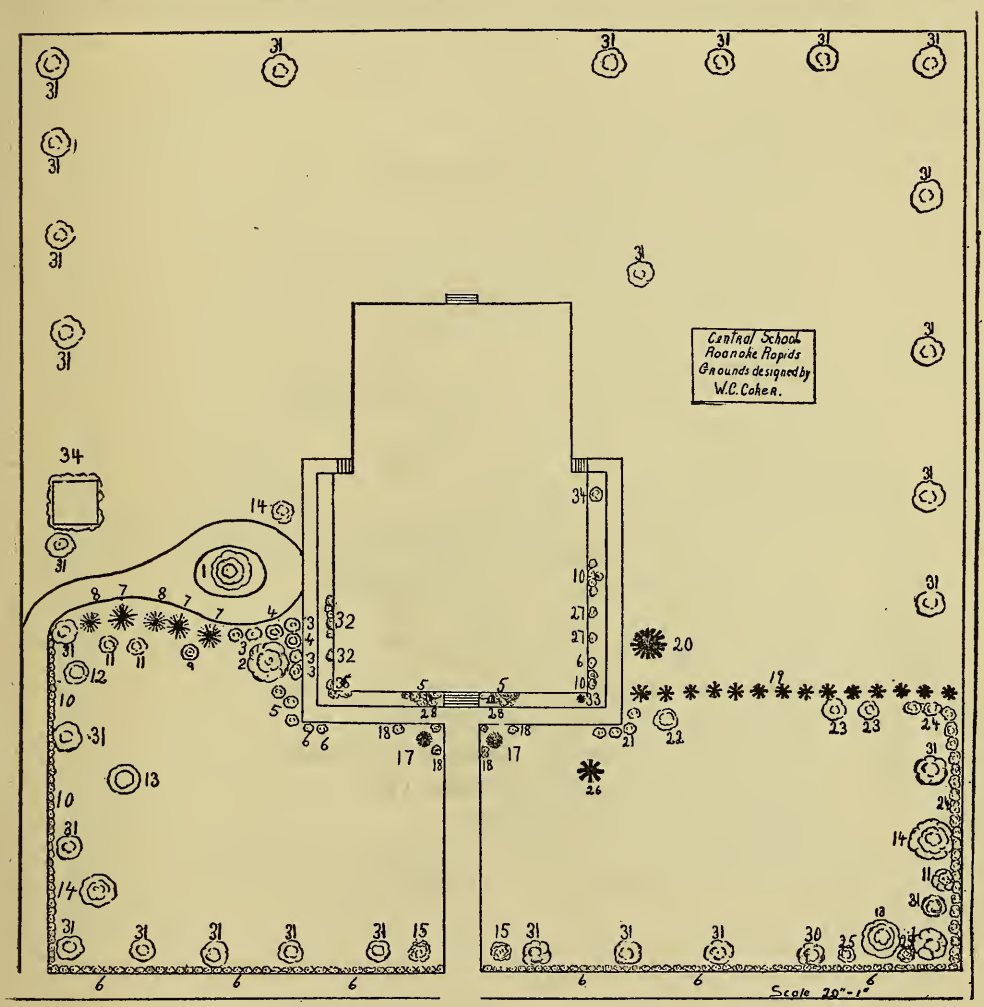


KEY OF PLAN FOR CENTRAL SCHOOL, ROANOKE RAPIDS

(Plate 19)

1. Magnolia, *Magnolia grandiflora.*
2. Horse-chestnut, *Aesculus-hippocastanus.*
3. Japanese Quince, *Pyrus japonica.*
4. Syringa, *Philadelphus grandiflora.*
5. Van Houtte's Spirea, *Spirea Van Houttei.*
6. Thunberg's Spirea, *Spirea Thunbergii.*
7. Loblolly Pine, *Pinus Taeda.*
8. Red Cedar, *Juniperus virginiana.*
9. Japanese Flowering Cherry, *Prunus Pseudo-Cerasus hortensis.*
10. Bridal Wreath, *Spirea prunifolia.*
11. Flowering Dogwood, *Cornus florida.*
12. Mimosa Tree, *Albizzia julibrissin.*
13. Beech, *Fagus grandifolia.*
14. Pin Oak, *Quercus palustris.*
15. Chaste Tree, *Vitex Agnus-castus.*
16. Smoke Bush, *Rhus cotinus.*
17. American Arbor-vitae, *Thuja occidentalis.*
18. Japanese Barberry, *Berberis Thunbergii.*
19. Canadian Hemlock, *Tsuga canadensis* (hedge).
20. Norway Spruce, *Picea excelsa.*
21. Persian Lilac, *Syringa persica alba.*
22. Soulange's Magnolia, *Magnolia Soulangeana.*
23. Crape Myrtle, *Lagerstroemia indica.*
24. Regel's Privet, *Ligustrum Ibota Regelianum.*
25. Sweet Breath of Spring, *Lonicera fragrantissima.*
26. Deodara Cedar, *Cedrus deodara.*
27. Hydrangea (found in place).
28. Climbing Rose (found in place).
29. Bush Rose (found in place).
30. Oak (found in place.)
31. Maple (found in place.)
32. Japanese Rose, *Rosa rugosa.*
33. Irish Yew, *Taxus baccata fastigiata.*
34. Quihoui Privet, *Ligustrum Quihoui.*
35. Japanese Snowball, *Viburnum tomentosum plicatum.*

PLATE 19

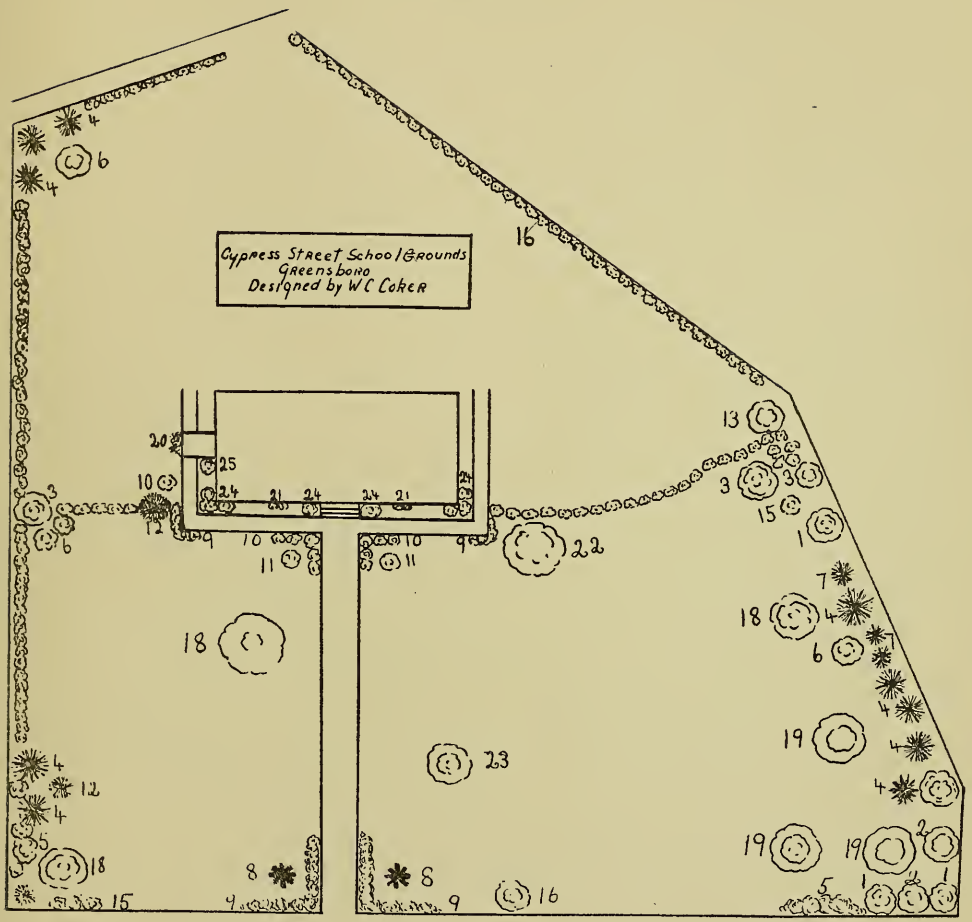

Central School
Roanoke Rapids
Grounds designed by
W.C. Cohen.
Scale 20'-1"

KEY OF PLAN FOR CYPRESS STREET SCHOOL, GREENSBORO

(Plate 20)

1. Dogwood, *Cornus florida.*
2. Redbud, *Cercis canadensis.*
3. Magnolia, *Magnolia grandiflora.*
4. Loblolly Pine, *Pinus Taeda.*
5. Syringa, *Philadelphus coronarius.*
6. Crape Myrtle, *Lagerstroemia indica.*
7. Jersey Pine, *Pinus virginiana.*
8. Deodara Cedar, *Cedrus deodara.*
9. Winter Jessamine, *Jasminum nudiflorum.*
10. Van Houtte's Spirea, *Spirea Van Houttei.*
11. Forsythia, *Forsythia suspensa.*
12. Red Cedar, *Juniperus virginiana.*
13. Mimosa, *Albizzia julibrissin.*
14. Bridal Wreath, *Spirea prunifolia.*
15. Japanese Quince, *Pyrus japonica.*
16. Trifoliate Orange, *Citrus trifoliata.*
17. Smoke Bush, *Rhus cotinus.*
18. Sugar Maple, *Acer saccharum.*
19. Oak, *Quercus* (found in place).
20. Wisteria, *Wisteria chinensis.*
21. Japanese Barberry, *Berberis Thunbergii.*
22. Pin Oak, *Quercus palustris.*
23. Beech, *Fagus grandifolia.*
24. Oak-leaved Hydrangea, *Hydrangea quercifolia.*
25. *Deutzia crenata.*

PLATE 20


Cypress Street School Grounds
Greensboro
Designed by W C Coker